A UNIFIED APPROACH TO GROUP PROCESSES AND MOTIVATION: SOCIAL IDENTITY AND SELF-DETERMINATION

by

CURTIS LEONARD SINCLAIR

A thesis submitted to University of Staffordshire for the degree of

DOCTOR OF PHILOSOPHY

Department of Sport and Sciences

School of Health, Education, Policing, and Sciences

Staffordshire University

April 2024

ACKNOWLEDGMENTS

This journey is one that has taken several years. Reaching the end of this period of academic study would not have been possible without the support of some incredible people and I take great pleasure in being able to thank them here.

First and foremost, I would like to thank my Nan, whose love and care have been my guiding light during this long journey and throughout life. Your hard work and dedication to others has been and continues to be an inspiration to me. More importantly, though, you have continued to show unwavering faith in my abilities, which I have been able to draw upon during the most challenging moments.

To my supervisor, Professor Matthew Slater, whose expertise and insightful critiques have helped to guide me through this long journey. Your guidance throughout my Master's degree and my PhD has not only shaped this thesis but has also given me the confidence and skills to pursue a career as a social researcher. It has been a pleasure and a privilege to study and work with you over the last decade.

To my loving partner, Gregory, your endless patience, understanding, and sacrifices during the final years have not gone unnoticed. I look forward to creating new and exciting memories with you post-thesis.

Lastly, I am also grateful to my family, friends, and colleagues who have each contributed in small but no less meaningful ways through offering a listening ear, words of encouragement, and critical discussions of the ideas presented in this thesis.

Contents

ABSTRACT

Traditionally, the social identity approach (SIA; Tajfel & Turner, 1979; Turner et al., 1987) and self-determination theory (SDT; Deci & Ryan, 1985a; Deci & Ryan, 2002) frameworks have been studied independently of each other. A substantial amount of literature exists in support of the main tenets of both. Yet, an area of research has developed in which these two frameworks have been are brought together to form a unified approach. The current thesis aims to advance this area of research by examining the relationship between social identification, basic psychological needs, and regulatory types of motivation in the context of groups and different settings. Although previous research has adopted a unified approach, there has been a great deal of variation in how the various core components of each framework have been utilised. More research is required to consider how these relationships might change over time or how they relate to more direct measures of behaviour, such as performance outcomes. Lastly, much of the current research has focused on variable-centred methods (e.g., structural equation modelling), which cannot identify underlying heterogeneity where this might exist.

To address these limitations, this thesis begins by examining the underlying components of basic psychological needs from SDT (i.e., autonomy, competence, and relatedness) and SIA (i.e., centrality, satisfaction, and commitment) utilising both variable- and person-centred approaches (Chapter 3). The variable-centred approach used structural equation modelling. It offered a method for modelling the relationships between variables and using this information for predictions about outcome variables. The person-centred approach involved the use of latent profile analysis. It offered a method for understanding the underlying subgroups within the data instead of examining the results as though participants exist as a homogeneous group. The results of Study 1 ($N = 281$) showed that the relationship between social identification and perceived stress of employees was found to be mediated by need frustration. In Phase 2 ($N = 281$), the person-centred approach highlighted the heterogeneity in the population with six distinct subgroups (i.e., latent profiles) being identified. The findings highlighted the benefits of conducting the two approaches and initial evidence of the interplay between basic psychological needs and social identification.

In Chapter 4, Study 2 was an experimental approach ($N = 250$) that examined whether priming a meaningful social identity or competence support could facilitate improvements in performance on a choice reaction task. The results showed that performance improved with each

trial under conditions of greater competence support (in alignment with SDT) and team identification (supporting the SIA). However, when these effects were combined, performance did not significantly improve. This unexpected result was hypothesised to be a consequence of excessive cognitive load and a heightened sense of pressure to perform well. Further findings reflected strategies that help groups to maintain or improve their social status (e.g., social competition). Yet, the lack of baseline measures means that some caution is required when considering these findings within the broader context of the unified approach.

Chapter 5 investigated the experiences of amateur footballers during a period of the football season. A longitudinal survey design was used to examine the role of initial team identification and satisfaction of basic psychological needs in predicting motivational profile membership at two points in time. Motivational profile membership was further examined in terms of burnout and physical health outcomes at time 1 and 2. In Study 3 ($N = 338$), latent profile analysis was used to identify the underlying subgroups, which were then used to confirm the profile identified for use in the longitudinal analysis. Overall, the study showed that motivational profiles remained largely stable across the football season. Adverse experiences of burnout and physical health were associated with membership of the least self-determined latent profile.

This thesis made several significant and novel contributions to advancing the unified approach literature. This thesis: 1) showed that the underlying motivational profiles were not captured by more traditional variable-centered analysis (i.e., structural equation modelling (SEM)) (Chapter 4); 2) through adopting a person-centered approach, identified distinct subgroups, showing the diversity of motivational and group experiences within a population (Chapters 4 and 6); 3) provided evidence of individuals within a seemingly homogeneous group (e.g., amateur footballers) exhibiting distinct profiles associated with motivation, basic psychological needs (BPN), and social identity (Chapters 4 and 6); 4) showed that motivational profiles have specific characteristics that shift over time, influenced by factors like team identification and the fulfillment of BPN (Chapter 6); 5) demonstrated that satisfaction of BPN and a strong sense of social identity contributed positively to motivational profiles, which in turn were linked to better performance and health outcomes (Chapters 4, 5, and 6); 6) showed that the combined priming effects of BPN and social identification were not associated with a boost in performance (Chapter 5); and 7) provided evidence towards better understanding the link between relatedness and social identity processes (Chapters 4, 5, and 6).

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ABQ Athlete Burnout Questionnaire.

AIC Akaike information criterion.

aLRT Lo-Mendell-Rubin adjusted loglikelihood ratio test.

BIC Bayesian information criterion.

BLRT boot-strap loglikelihood ratio test.

BNSSS Basic Needs Satisfaction in Sport Scale.

BPN basic psychological needs.

BPNSFS Basic Psychological Needs Satisfaction and Frustration Scale.

CFA confirmatory factor analysis.

CFI comparative fit index.

FISI Four-Item Social Identification.

High CM-High TI high competence - high team identification.

High CM-Low TI high competence - low team identification.

IMI Intrinsic Motivation Inventory.

Low CM-High TI low competence - high team identification.

Low CM-Low TI low competence - low team identification.

LPA latent profile analysis.

LTA latent transition analysis.

MIIS Multi-Component Ingroup Identification Scale.

MLM maximum likelihood mean-adjusted.

MLR maximum likelihood estimation with robust standard errors.

PHQ Physical Health Questionnaire.

PSS Perceived Stress Scale.

RMSEA root-mean-squared error of approximation.

SABIC sample-size adjusted BIC.

SCT self-categorisation theory.

SDT self-determination theory.

SEM structural equation modelling.

SIA social identity approach.

SIT social identity theory.

SMS-II Sport Motivation Scale-II.

SRMR standardized root mean squared.

TLI Tucker–Lewis index.

1 INTRODUCTION

Motivation and group processes have been two of the most significant areas of research within the field of psychology, and for good reasons. If the broad aims of psychology have been to study the human mind and behaviour at the individual and group-level, then understanding motivation and group processes are critical pieces (VandenBos, 2015). In everyday life, people interact with each other one-on-one or in larger social groups (e.g., workplace teams, family groups, sports teams). Such social groups would enable an individual to achieve some desired outcome through group membership, such as fun and enjoyment, winning a football match, or driving social change.

The outcomes described above would only have occurred through individuals engaging in a set of actions. Yet, these actions would not occur without some underlying reason for initiating the behaviour in the first instance. In this regard, all forms of behaviour require people to be moved to act, exert effort, expend energy, remain focused, and be disciplined (Ryan & Deci, 2007). Sustaining this action over time governs whether a desired outcome is successfully achieved. Broadly, this describes the underlying features of motivation.

The social identity approach (SIA; Tajfel & Turner, 1979; Turner et al., 1987) and self-determination theory (SDT; Deci & Ryan, 1985a; Deci & Ryan, 2002) are two frameworks that have been at the forefront of psychological research on human behaviour concerned with group processes and motivation, respectively. Yet, a clear divide has been evident in the lack of empirical studies that combine these two frameworks. Consequently, very little progress has been made in studying the similarities or differences between the two frameworks. This thesis presents a set of studies with the primary aim of making a significant contribution towards understanding the benefits of bringing together the SIA and SDT frameworks into a unified approach.

Over time, sports and exercise settings have provided a useful background to further understand these issues. For instance, there are widely accepted health and well-being benefits from engagement in physical activity across the lifespan (e.g., Penedo & Dahn, 2005). Yet, given these well-documented health benefits, a pandemic of inactivity exists (Sallis et al., 2016). Clearly, the health benefits alone have been insufficient in enticing people to engage in the necessary physical activity that can be effective in reducing risks of disease morbidity. This represents an important topic because understanding the factors that can necessitate greater involvement in physical

activities will also provide a clearer picture of the motivational and group processes involved with applications to other domains.

Work in motivation is well established and has thus been extensively applied in various domains, progressing our understanding of the underlying processes that govern action. In recent years, there has been a growing focus on the role that groups play as an alternative perspective to understanding the reasons that lead people to act (e.g., Stevens et al., 2018). For instance, attending a gym class, playing a football match, or jogging will be governed by different motivation and group-level processes. While these experiences may share some similarities, there are notable differences. For example, the camaraderie in a group setting is difficult to replicate when an individual goes for a run.

There remains a significant gap within the psychological literature that fully captures the motivational and group processes coherently and comprehensively. Based on the extensive supporting literature, both theories have made significant and lasting contributions to their respective fields (Brown, 2020; Hagger & Chatzisarantis, 2008). Broadly, the SIA focuses on the role of group membership and intergroup relations (Tajfel & Turner, 2004). In contrast, SDT focuses on the phenomenological and qualitative experience of motivation and how this experience can be influenced by a person's interactions with their social environment (Deci & Ryan, 2008; Ryan & Deci, 2000b). In both cases, significant others (e.g., friends, family, colleagues), to a lesser or greater extent, play an important role in the explanations put forward by each framework of what drives human behaviour (Ryan & Deci, 2020; Tajfel & Turner, 1979).

The frameworks have substantial empirical support but this does not make them immune from criticism. For instance, critics have highlighted SDT as individualistic in nature and not at all concerned with how social groups might influence motivation (e.g., Platow & Grace, 2020). The SIA has been accused of not being falsifiable because outcomes can either be re-framed or act as a means for extending the explanatory reach of the framework (Hornsey, 2008).

Presently, there exists a paucity of research that has examined the unified approach (e.g., Martela et al., 2021; Platow & Grace, 2020). The empirical research that does exist covers only a small number of issues. For instance, studies have examined the underlying motivation for an individual being a member of a particular group (e.g., Amiot & Sansfacon, 2011). There have been no attempts to examine the full range of motivational and group processes that are central tenets of the two frameworks. Research has typically been restricted to cross-sectional analysis with a small

number of studies examining change over time (e.g., Amiot et al., 2010; Greenaway et al., 2017). The studies have covered a broad spectrum of populations and settings, but few have examined the unified approach in work or performance-type settings. Lastly, no attempts have been made to examine the impact of attempting to modify concepts from both frameworks simultaneously and the subsequent impact this might have on group outcomes. Yet, this small but growing literature provides useful insights that tentatively suggest that many of the criticisms levelled at each framework can be overcome by adopting a unified approach (e.g., Martela et al., 2021).

Grounded in a unified approach, the broad aims of this thesis were to contribute to this area of knowledge in several key ways by exploring (i) possible relationships between key concepts of the SDT (e.g., relatedness) and SIA (e.g., social identification) frameworks; (ii) the effects of incorporating core concepts of the SDT and SIA on measures of performance and well-being; (iii) the combined effects of support for BPN and social identification; (iv) the longitudinal relationship of the core concepts of SDT and SIA; and (v) within the context of performance-based settings (i.e., workplace, sport).

1.1 Structure of this Thesis

Chapter 2 reviews the relevant literature concerning the two main frameworks underpinning this thesis: the SIA and SDT. This includes a substantive and growing evidence base that supports the theoretical basis of each framework. Within this literature were numerous examples that demonstrated the positive outcomes, such as improved well-being (e.g., Ntoumanis et al., 2021) or physical activity engagement (e.g., Beauchamp et al., 2018), associated with reports of self-determined motivation or strongly identifying with a particular group. The chapter concludes by reviewing the limited literature that has adopted a unified approach and indicates a clear need for further research in this area. Chapter 3 outlines the theoretical underpinnings of the SIA and SDT in the context of how each will be used within the unified approach adopted for this thesis.

Chapter 4 examines the relationship between core components of SDT (i.e., autonomy, competence, and relatedness) and SIA frameworks (i.e., centrality, satisfaction, and commitment). To achieve this aim, a cross-sectional survey was administered to individuals employed in an office-based role who work primarily face-to-face with colleagues in teams of 10 or more people. Participant's teams were already established and provided sufficient context for assessing the underlying components of SDT and SIA using structural equation modelling in the first phase of Study 1. Phase 2 adopted a person-centred approach in the form of latent profile analysis (LPA)

using the same data to compare and contrast against the variable-centred approach used in Phase 1. Using latent profile analysis offered a method for understanding the underlying subgroups (i.e., latent profiles) within the data instead of examining the results as though participants existed as a homogeneous group.

Chapter 5 presents Study 2 and takes an experimental approach to examine whether facilitating ingroup identification and fulfilment of BPN leads to positive performance gains on a choice reaction task. Participants were randomly assigned to the control group or four experimental conditions. The experimental manipulations were achieved through instructions given to participants about how their performance on the task would be used collectively with other members of a pseudo team and feedback on their performance.

Chapter 6 presents Study 3 and focuses on amateur footballers' experiences during the season. These experiences were captured using a longitudinal survey measuring levels of ingroup identification, motivation, satisfaction of BPN, burnout and physical health. The data were analysed using LPA to identify the underlying subgroups from a cross-sectional perspective. The identified subgroups were then used to inform the latent transition analysis, a longitudinal variant of LPA.

The final chapter presents the general discussion and draws together the main findings from the three studies with consideration of the presented literature. The chapter concludes by discussing the practical implications, the main limitations of the thesis, and future directions for research.

2 REVIEW OF THE LITERATURE

2.1 Introduction

Having briefly touched on the strength of evidence for each framework in Chapter 1, it is important to fully understand the need for a unified approach to motivation and group processes. Thus, a more detailed review of the current and relevant literature on the social identity approach (SIA) and self-determination theory (SDT) will follow. This overview of the supporting literature for each framework focuses on findings from a range of domains but with a particular interest in those relevant to the current thesis, including, but not limited to, performance-type settings (e.g., sport, exercise, academia, and employment). The literature review then considers research that has already examined the two frameworks using a unified approach. The evidence in this section spans various domains because of the limited research undertaken thus far. Chapter 3 examines the theoretical basis of the SIA and SDT and outlines the theoretical rationale for selecting these two frameworks. However, as will become clear from the evidence presented in this chapter, the SIA and SDT frameworks have gained extensive empirical support and provide strong support in justifying their selection for this thesis.

2.2 Self-Determination Theory

SDT is a psychological framework that seeks to explain human motivation and the factors that influence the degree to which behaviours are experienced as self-determined (e.g., intrinsic, identified; Deci & Ryan, 1985a, 2000). That is engagement in behaviour for its own sake rather than to attain some external reward (Deci & Ryan, 2000). At the core of SDT is the notion that individuals have an inherent tendency to actively seek out experiences that satisfy their basic psychological needs (BPN) for autonomy (i.e., to feel volitional), competence (i.e., to demonstrate capability), and relatedness (i.e., to feel connected to others).

Empirically, the SDT framework has been applied to various domains including education (e.g., Vansteenkiste et al., 2006), health (e.g., Chatzisarantis et al., 2009), sport (e.g., Sheldon et al., 2013), exercise (e.g., Teixeira et al., 2012), religion (e.g., Hardy et al., 2022), psychotherapy (e.g., Ryan & Deci, 2008), parenting (e.g., Joussemet et al., 2008), and employment (e.g., Howard et al., 2016). In addition, the substantial evidence base has also demonstrated the positive outcomes associated with experiencing behaviour as self-determined. These positive outcomes include well-being (e.g., Edmunds et al., 2007), performance (e.g., Jeno & Diseth, 2014), adherence

(e.g., Sylvester et al., 2016), persistence (e.g., Vallerand et al., 1997), commitment (e.g., Garcia-Mas et al., 2010), and enjoyment (e.g., Jaakkola et al., 2015).

2.2.1 The Role of Motivation

This extensive literature has consistently supported the core tenets of SDT. A meta-analysis examining the continuum structure of motivation was largely supported and found to be ordered from least (e.g., amotivation, external) to most self-determined (e.g., intrinsic, identified; Howard et al., 2017). The motivational continuum has allowed for unique insights concerning differences that exist in various groups engaging in the same or similar behaviour, such as partaking in an exercise group (e.g., Hagger & Chatzisarantis, 2008; Teixeira et al., 2012). For instance, individuals in the early stages of engaging in new behaviours, such as starting an exercise class to improve physical fitness, might exhibit behaviour regulated by an underlying need for self-approval. Behaviours that are regulated by self-approval have been found to help improve persistence in tasks they would otherwise not engage in (e.g., Teixeira et al., 2012; Vallerand et al., 1997). Behaviours that are regulated by self-approval have been found to help improve persistence in tasks they would otherwise not engage in (e.g., Teixeira et al., 2012; Vallerand et al., 1997). Although the findings for this tend to be mixed, it is argued to relate to the unstable nature of the behaviour when driven by a need for self-approval (Teixeira et al., 2012). This regulatory type is highly predictive of initial and short-term adoption compared with self-determined motivation, while the latter is more predictive of long-term exercise adherence (Ntoumanis et al., 2021; Teixeira et al., 2012). This particular finding highlights the importance of differentiating motivation and not assuming that self-determined motivation will always be the optimal motivation for every setting or activity. For example, a lack of motivation, which is typically associated with negative outcomes, contributed positively to competitive football players' consideration to switching to an alternative sport whilst at the same time negatively contributing to enjoyment and commitment (Garcia-Mas et al., 2010).

From a performance perspective, research has indicated that outcomes are highly dependent on where along the continuum motivation falls, mediated by other contextual factors such as the type of task being completed or the rewards on offer for completing a task (Cerasoli et al., 2014; Weibel et al., 2009). For instance, a study by Black and Deci (2000) investigated the effects of rewards and verbal feedback on self-determined motivation in an educational task. The study found that while rewards decreased the experience of self-determined motivation, positive verbal feedback had the opposite effect, as it was seen as supporting a student's autonomy.

A recent meta-analysis that examined the relationship between BPN, rewards, and performance, found that all three BPN predicted performance (Cerasoli et al., 2016). Moreover, introducing incentives led to a negative association between BPN and performance when there was a clearly defined goal for receiving the incentive. This was argued to be because the presence of an incentive would undermine autonomy. Conversely, vaguely specified goals, such as completing a behaviour that did not guarantee receiving an incentive, led to a positive association with the satisfaction of autonomy and competence. Thus, rewards can have both facilitative and detrimental effects on motivation and BPN. How a reward is initially framed and, crucially, how the recipient subsequently perceives it determines whether it positively or negatively affects degrees of BPN, motivation, and any outcomes.

2.2.2 Autonomy and Competence

A person's social environment plays a vital role in affecting BPN satisfaction, motivation, and well-being (e.g., Ntoumanis et al., 2021). When social agents, such as a coach or peers, are perceived to support an athlete's autonomy by providing choices and involving them in decision-making, each BPN can be satisfied (Adie et al., 2012; Alvarez et al., 2009; Gagne et al., 2003; González et al., 2016; Mossman et al., 2022; Quested et al., 2013). Moreover, the satisfaction of BPN has been consistently shown to subsequently mediate the experiencing of self-determined motivation (Alvarez et al., 2009; Cuevas-Campos et al., 2020; Edmunds et al., 2007; González et al., 2016; Quested et al., 2013). Consequently, fostering self-determined motivation is instrumental in facilitating positive outcomes such as improved well-being and enjoyment (Adie et al., 2012; Bureau et al., 2022; Edmunds et al., 2007; Ng et al., 2012; Reis et al., 2000). Additionally, longitudinal research has shown that this proposition holds over time (Adie et al., 2012; González et al., 2017; González et al., 2016; Reinboth & Duda, 2006).

Similarly to the literature on autonomy support, research has focused on the effects of perceived support for competence, which reflects, for example, a coach providing encouragement or positive feedback (e.g., Mertens et al., 2018). The result of perceiving competence support has typically been associated with competence satisfaction and self-determined motivation, which subsequently mediate positive outcomes, such as improved performance and well-being (Berntsen et al., 2019; Fransen, Boen, et al., 2018; Fransen, Vansteenkiste, et al., 2018; Losier & Vallerand, 1994; Mertens et al., 2018). In the long term, the impact of perceived competence support on motivation has shown inconsistent results. Some evidence indicates competence support can

influence motivation over time (e.g., Losier & Vallerand, 1994), while other studies suggest the effects can diminish with time throughout a season (e.g., Berntsen et al., 2019).

2.2.3 Relatedness

The role of relatedness has been suggested to differ from competence and autonomy. Whereas competence and autonomy are viewed as vital for facilitating intrinsic motivation, relatedness has been suggested to have a more crucial role in driving an individual's willingness to endorse values and behavioural regulations held by social agents (Deci & Ryan, 2000; Ryan & Deci, 2000c). This helps to promote a sense of belongingness with significant others. Empirical research has not consistently supported this proposition (Calvo et al., 2010; Ntoumanis, 2001; Standage et al., 2003; Xiang et al., 2016). However, research has tended to be focused on perceived support for either autonomy or competence, with relatedness examined in terms of the degree to which it has been satisfied as a consequence of support for autonomy or competence (e.g., Gagne et al., 2003; Mertens et al., 2018). Nonetheless, relatedness has been found to be an important factor under certain conditions (Calvo et al., 2010; Cox & Williams, 2008; Standage et al., 2003; Williams et al., 2013). Given the array of influential figures, such as peers and parents, who are often present in a person's life, it is unsurprising that each one has the potential to foster an environment that nurtures or hinders an individual's sense of belonging (Calvo et al., 2010; Williams et al., 2013; Xiang et al., 2017).

Findings from academic and physical activity settings have found that the three BPN are not always important in explaining behavioural outcomes. For instance, relatedness and competence were better predictors of intrinsic motivation (Standage et al., 2003), autonomy and relatedness better able to explain persistence (Calvo et al., 2010), and increased relatedness satisfaction (versus decreased autonomy satisfaction) led to greater levels of adherence (Edmunds et al., 2007). Research has found that autonomy support can have a direct effect on satisfying relatedness because autonomy supports the satisfaction of all three BPN, but, more importantly, as it facilitates interpersonal relationships between individuals and social agents (Edmunds et al., 2006; Gagne et al., 2003; Kim & Gurvitch, 2020; Williams et al., 2013). Relatedness has also been found to be supported by the physical space an individual finds themselves in. For instance, young female golf players derived relatedness from a sense of security and familiarity with their golf club surroundings (Williams et al., 2013).

Interestingly, relatedness has been shown to positively correlate with more controlled forms

of motivation and, subsequently, more adaptive outcomes, even in situations where adverse effects would be typically expected (Neys et al., 2014; Ntoumanis, 2001; Vallerand et al., 1997). Researchers have argued that these findings might reflect the influence of different social agents that subtlety undermine the internalisation of behaviour, that controlled motivation could have varying outcomes dependent on the setting, or engaging in an activity for the purpose of avoiding social isolation (Ntoumanis, 2001; Vallerand et al., 1997).

In a novel approach, a study by Reinboth and Duda (2006), examined both coach and team relatedness in an athlete sample over the course of a season. The main finding was that only perceptions of coach relatedness predicted increased well-being, while team relatedness did not. It was suggested that coach relatedness was likely to better account for the quality of the coach-athlete relationship. Furthermore, dependent on the framing of the task as either ego (e.g., demonstrating superiority) or task (e.g., demonstrating mastery) involving relatedness could either be undermined or facilitated (Reinboth & Duda, 2006).

The empirical evidence has highlighted the role each BPN plays depending on various contextual factors. This notion is captured in recent work that has directly examined the interplay between each BPN (Curran et al., 2016; Jang et al., 2016; Reeve & Lee, 2014). Within this body of work, the results have suggested that the satisfaction of one BPN facilitates the satisfaction of each BPN. However, these studies also found that over time there was a mutually reinforcing effect between engaging in a particular behaviour and satisfaction of BPN associated with that activity (Curran et al., 2016; Jang et al., 2016). Thus, as time progresses, the satisfaction of BPN and activity engagement both increase because of effects from themselves and each other.

Many of the studies presented in this section relate to individuals who ordinarily would be part of a team, such as an athlete or a member of an exercise class. The study by Gonzalez (2017) appears to be the first attempt to examine the effects of perceived autonomy support at individual and team-levels. While the individual-level findings were broadly in line with the general proposition that BPN mediate the relationship between autonomy support and self-determined motivation, limited support was found for the proposition at the team-level. The only significant finding at the team-level was for perceived autonomy support from the coach at the beginning of the season, predicting autonomy and relatedness satisfaction. Thus, the analysis was unable to demonstrate the full mediation pathway that was present at the individual-level. The authors suggested that the aggregation of data, leading to less variability at the team-level, likely

contributed to the lack of significant results. The next section introduces research specifically designed to address the challenge of aggregation at small scales, such as sports teams, and to more broadly detect heterogeneity within a population (Muthen & Muthen, 2000).

2.2.4 A Person-Centred Approach to Motivation

The development of the continuum of motivation has enabled groups to be distinguished by the degree to which their behaviour is experienced as self-determined (e.g., Teixeira et al., 2012). Further progress has come from applying a person-centred analytical approach to the motivational continuum (e.g., Cece et al., 2018). In brief, person-centred approaches, such as latent profile analysis (LPA), aim to identify 'hidden' subgroups within a sampled population (Spurk et al., 2020; Williams & Kibowski, 2016). This differs to more traditional variable-centred approaches that would typically treat the sampled population as though a homogeneous group (Muthen & Muthen, 2000; Saward et al., 2024). The person-centred approach compliments the motivational continuum because each type of motivation can be represented as a single profile for each subpopulation.

Motivational profiling has helped to advance the theoretical underpinnings of the SDT framework in a number of important ways. First, there are a number of motivational profiles that have been commonly found across a range of different settings (e.g., Gillet et al., 2009; Martinent & Decret, 2015; Vlachopoulos et al., 2000). Beyond the set of commonly identified motivational profiles, when studied over time these same profiles show stability in the shape of the profiles and the individuals who make up the profiles (Cece et al., 2018; Gillet et al., 2017; Oga-Baldwin & Fryer, 2018).

Second, although profile stability is an important and significant contribution, latent transition analysis (LTA), a longitudinal form of LPA, goes much further in allowing researchers to understand the movements of individuals between latent profiles while also understanding the factors that might predict these transitions. Previous LTA studies have suggested that profile membership typically holds stable between time points, with probabilities of remaining in the same subpopulation ranging from .50 to .96 (e.g., Cece et al., 2018; Gillet et al., 2017; Martinent & Decret, 2015). Under conditions where transitions were more likely to occur, profile stability was associated with the more self-determined forms of motivation (Cece et al., 2018; Corpus & Wormington, 2014; Gillet et al., 2017; Grasten et al., 2023; Xie et al., 2021).

Third, profiles that are considered to be more adaptive are associated with better well-being or performance, which broadly reflects the findings from variable-centred research

(Lemyre et al., 2007; Raedeke & Smith, 2001). However, where the results diverge between the variable and person-centred approaches is the ability of the latter to allocate distinct outcomes to each latent profile.

Fourth, multiple forms of motivation can be associated with a single behaviour simultaneously (Ryan et al., 2009; Ryan & Deci, 2020). For example, an individual might engage in a sport for the pure enjoyment of taking part while simultaneously wanting to participate to lose weight to obtain approval from a partner. A number of studies have identified a motivational profile that reflects this relative contradiction perfectly. The motivational profile presents with high levels of the most self-determined (i.e., intrinsic, identified, integrated) and the least self-determined (i.e., extrinsic, introjected) forms of motivation (Gustafsson, Carlin, et al., 2018; Howard et al., 2020; Parker et al., 2021; Saward et al., 2024; Wang et al., 2016). The high levels of the least self-determined forms of motivation would typically be associated with poorer outcomes, such as experiencing burnout (e.g., Saward et al., 2024). Yet, findings indicate that the presence of high levels of the most self-determined motivation acts to counteract the effects typically associated with the least self-determined motivations (Gustafsson, Carlin, et al., 2018; Saward et al., 2024; Wang et al., 2016).

In summary, there exists an extensive evidence base in support of the main tenets of the SDT framework. Experimental and applied research is supported by various reviews that have provided evidence for the importance of autonomy-supportive environments in fulfilling BPN for self-determination, competence, and relatedness. The SDT framework puts forward a broad and comprehensive explanation of human motivation that has been shown to predict a range of positive outcomes. The motivational continuum also offers a unique way of distinguishing motivational types that reflect the increasing internalisation and integration of regulations for enacting a behaviour. The structure of this continuum has been supported across a range of studies. In the next section the empirical literature on the SIA is reviewed.

2.3 Social Identity Approach

The SIA is a psychological framework that seeks to explain the psychology of groups, more specifically, how individuals define themselves in group terms so that their identity is derived by their group membership. This process is called social identification (Tajfel & Turner, 1979). The consequences of social identification influence an individual's behaviour, beliefs, and emotions (Beauchamp et al., 2018; Gray et al., 2018; Wyke et al., 2015). This burgeoning body of work has

rapidly developed empirical findings that demonstrate the positive effects of socially identifying with a group, including improvements in activity engagement (e.g., Stevens et al., 2019), performance (e.g., Wegge & Haslam, 2005), mental health (e.g., Haslam et al., 2016), health and well-being (e.g., Jetten et al., 2015), and self-esteem (e.g., Willis et al., 2019). These findings extend across a range of life domains including but not limited to health (e.g., Steffens et al., 2021), employment (e.g., van Dick & Haslam, 2012), sport (e.g., Rees et al., 2022), and education (e.g., Bliuc et al., 2011). Although the literature on sport and exercise is a relatively new area of investigation, it is overshadowed by the extensive body of research for the SDT in the same setting (Platow & Grace, 2020).

2.3.1 Group Membership

The minimal group experiments served as an initial demonstration of how simply assigning individuals to rival groups on arbitrary grounds can foster a sense of group identity and, more significantly, affect behaviour (Billig & Tajfel, 1973). This principle can be seen in a variety of studies that use self-report measures to examine self-definition derived from group membership (Coffee & Schertzinger, 2020; Stevens, Rees, Coffee, Steffens, et al., 2020; Stevens et al., 2019). For instance, members of parkrun, which is a community-based 5k run or walk, had their group membership made salient by the simple act of prefixing a survey question with the statement "thinking about parkrun as a whole..." (p. 8, Stevens et al., 2019). Similarly, this approach was taken in other studies, which demonstrate the ease that an individual can come to define themselves in terms of a social identity (Coffee & Schertzinger, 2020; Stevens, Rees, Coffee, Steffens, et al., 2020). Therefore, when a social identity becomes prominent, and group membership results in stronger social identification, behavioural changes are often observed (Beauchamp et al., 2018; Levine et al., 2005; Levine & Reicher, 1996; Tarrant & Butler, 2011; Van Knippenberg et al., 2007).

Studies have also shown that when individuals identify with a group, their self-esteem is improved as a consequence of the quality and quantity of group memberships in an individual's social life (Bailis et al., 2008; Greenaway, Haslam, et al., 2015; Steffens et al., 2021; Stevens et al., 2019; Willis et al., 2019). Furthermore, when self-esteem is enhanced and facilitated by group membership, it has consistently been found to mediate improvements in physical and psychological health (Greenaway, Haslam, et al., 2015; Steffens et al., 2021). These improvements are hypothesised to occur because a greater sense of self-esteem is linked to greater perceptions of self-control and capability (Greenaway, Haslam, et al., 2015; Jones et al., 2009; Thomas, Amiot,

et al., 2017). In turn, these factors play a crucial role in determining, for example, exercise participation because individuals feel they have a choice in and feel capable of engaging in an activity in which they have derived increased self-esteem (Greenaway, Haslam, et al., 2015). These findings also reflect a rapidly developing area of research that is focused on understanding the way in which group and social identity processes can act as the basis of a "social cure" (Jetten et al., 2017). A recent meta-analysis examined the effectiveness of social identity-based interventions to improve a wide range of health outcomes (Steffens et al., 2021). The results suggested that when interventions attempted to promote social identification a moderate-to-strong positive effect on health and a very strong effect for physical health was observed. Thus, the important role of social identification in promoting health outcomes is evident from this and other meta-analyses (Steffens et al., 2017).

2.4 Group Comparisons

When a group that a person identifies with (i.e., ingroup) is perceived to hold a higher social status on some relevant attribute (e.g., healthier) than another group to whom that person does not feel connected (i.e., outgroup), the ingroup has been found to be motivated to maintain the status quo (Tarrant & Butler, 2011). Conversely, where the ingroup is perceived less favourably to a relevant outgroup, it has been found to instigate social competition to improve their social status (Platow et al., 2014; Tarrant & Butler, 2011). Alternatively, an ingroup might engage in social creativity and choose a new, more favourable attribute to make their comparison against (Lalonde, 1992; Lalonde et al., 1987; Platow et al., 2014). For instance, a study by Platow and colleagues (2014) examined the perceived fairness of different approaches to classifying the number of medals won by each nation at the 2012 Olympic games. For nations that win many medals, their citizens believed that ranking in terms of total medals won was a legitimate and fair approach. In this sense, participants argued for continuing the status quo to maintain their country's supremacy. Conversely, for nations that won few medals, there were limited strategies for improving their status. This is because options like leaving their country or questioning the overall legitimacy of the Games themselves were impractical. Thus, social creativity offered various options for improving a nation's standing compared to other countries such as calculating the number of medals won per 1,000 population. Indeed, when participants were asked to rate the fairness of different ranking methods, they used fairness rules in such a way as to enhance the relative standing of their own nation by selecting a more favourable dimension to evaluate against other countries.

2.4.1 Group Behaviour

The minimal group studies (Tajfel et al., 1971) provided the first substantive evidence of the effect of perceived group membership on the behaviour exhibited by individuals who identify with a given group. The behaviour specifically observed in this experiment was participants allocating non-monetary rewards to both ingroup and outgroup members. Participants would often choose to award fellow ingroup members an amount that would maximise the difference with the amount awarded to an outgroup member, even if this meant ignoring the possibility of awarding a higher amount to an ingroup member.

Broadly, numerous studies have shown how specific social identities being made salient, such as ethnicity (e.g., Turner et al., 2015), age (e.g., Beauchamp et al., 2018), and gender (e.g., Floyd & Moyer, 2009) lead to behavioural changes such as increased exercise participation, improved well-being, and greater satisfaction in physical activity-based settings (Stevens et al., 2019). Moreover, this collection of studies offers a clearer explanation of the factors that determine which social identities are most likely to be made salient in a given social context and the subsequent outcomes. For instance, a study by Beauchamp, Carron, McCutcheon, and Harper (2007) examined the impact on exercise participation levels when older adults were randomly assigned to exercise groups where members either shared similarities or differed in terms of age. In accordance with self-categorisation theory, older adults showed a preference for exercising in classes that comprised similarly aged adults. Similarly, when Beauchamp, Dunlop, Downey, and Estabrooks (2012) included a wider range of surface (i.e., age, ethnicity, physical condition) and deep-level (i.e., attitudes, beliefs, values) characteristics they found evidence that perceived similarities at the surface-level led to increased adherence. There is evidence to suggest that surface-level characteristics that are more readily available to a perceiver, such as age and gender, play a crucial role in initial group formation (e.g., Harrison et al., 1998).

In a post-natal exercise group, the women were initially most likely to define themselves in terms of being postpartum mothers alongside other more obvious characteristics such as age (Beauchamp et al., 2012). When the self-category fits with the mother's understanding of the similarities and differences between being a mother in the postpartum period and not, and the exercise group having importance, both contribute to making a particular social identity salient. In this case, the social identity of being a member of a postnatal exercise group.

Further evidence comes from studies that found the different outcomes that individuals can

experience depend on which social identity is made salient in a given context (Campo et al., 2018, 2019). For instance, when athletes were primed to identify more with a social identity that corresponded with being an athlete in their sport (i.e., superordinate identity) they reported more positive and less negative affect towards their opponents (Campo et al., 2019). In contrast, when the athlete's club identity was made salient, they reported only an increase in positive affect towards their opponents. Positive emotions towards teammates increased for both greater salience in sport or club identities, but only when the club identity was made salient were negative emotions towards teammates reduced. Previous research has also shown the influence of either personal or social identity being made salient (e.g., Campo et al., 2018). Thus, the social identity available to an individual is influenced by various factors within a person's social environment.

Thus far, it is apparent that social identification has broad appeal because it is able to make important predictions about when and how group behaviour will occur grounded in the social context in which groups exist. The next section will consider the literature that demonstrates the positive effect of the application of the SIA when used as the basis for health-based interventions.

2.4.2 Health Benefits of Group Membership

Extensive empirical evidence within the broader health domain suggests that individuals are more inclined to adopt healthy behaviours when these behaviours align with the content of a salient social identity (e.g., Stevens et al., 2017). Individuals have been found to be more inclined to exercise with others with whom they share membership in a social category (Beauchamp et al., 2012; Beauchamp et al., 2015; Wyke et al., 2015). The advantages of stronger identification with a group extend beyond starting an exercise regimen; they also promote greater adherence (Beauchamp et al., 2012; Beauchamp et al., 2018; Bunn et al., 2023; Gray et al., 2018). Furthermore, research has shown that enhancements in adherence to physical activity routines tend to persist over the long term (Estabrooks et al., 2011). However, it would appear that when a group disbands, individuals can lack confidence in continuing a particular physical activity (Strachan et al., 2012). More recently, a number of studies have shown that belonging to multiple groups that are meaningful and important has direct implications for health and well-being that should be considered essential to healthy living (Lam et al., 2018; Sonderlund et al., 2017). For instance, a number of studies show that multiple group membership helps to alleviate loneliness and improve well-being as a direct consequence (Bentley et al., 2022; Haslam et al., 2019; Haslam et al., 2022; van Dick et al., 2023). Thus, evidence suggests that meaningful and important groups

provide several advantages beyond improving adherence in group-based activities.

For groups where health is not the primary focus, improvements in well-being are still observed. For instance, several studies in education and work-based settings have shown that when individuals identify strongly with their school or workplace, they experience a range of benefits, including improvements to well-being (Dunstone et al., 2023; Haslam et al., 2009; Klik et al., 2023; Knight & Haslam, 2010; Schumacher Dimech & Seiler, 2011).

Lastly, performance can also be positively affected by an individual who identifies strongly with a given team and findings from the domains of sport and work supports this notion (Evans, 2014; Knight & Haslam, 2010; Pain & Harwood, 2009; Slater et al., 2013, 2018). For instance, an observational study by Slater and colleagues (2018) used passion shown in singing a national anthem during an international football tournament as a proxy for determining the strength of social identification. Results showed that teams that were independently assessed to sing their national anthem with the greatest passion showed greater performance outcomes. Greater passion was associated with conceding fewer goals and, dependent on the tournament stage, with a higher likelihood of winning. The authors argued that displays of passion reflected a stronger sense of shared social identity, which subsequently affected the collective effort and performance of the players during the match (Slater et al., 2018). Thus, it is clear from the presented evidence that the application of SIA framework has the potential to foster positive outcomes for group members. Decades of research evidence highlights the array of improvements to health, well-being, and performance that span a diverse number of groups and settings. In the next section, research that has adopted a person-centred approach is reviewed.

2.4.3 A Person-Centred Approach to Group Processes

The person-centred approach has received comparatively little attention from the social identity perspective. Although, there are a few instances where this approach has been applied to health and performance issues within a longitudinal design. Studies that have investigated social identity using LPA have typically considered this as a predictor of different types of latent profiles such as burnout (Gustafsson, Martinent, et al., 2018; Xie et al., 2022) and social support (Bruner et al., 2022). A study conducted by Gustafsson and colleagues (2018) examined the role of performance-based self-esteem and athletic identity in determining the risk of burnout in a group of Swedish junior athletes. When athletic identity was high, athletes were significantly less likely to be members of the high burnout profile. Conversely, athletes who reported higher degrees of

self-esteem linked to performance were significantly more likely to be in the high burnout profile. Prior to this study, other studies had found no relationship between athletic identity and burnout (e.g., Verkooijen et al., 2012) and others suggested that it helped to reduce burnout (e.g., Raedeke, 1997). Thus, the variable-centred methods previously used might have contributed to this inconsistency within the literature (Gustafsson, Martinent, et al., 2018).

In another study, the importance of social support of friends, family, and coaches for adolescent male athletes were examined (Bruner et al., 2020). Four distinct profiles were identified that ranged from higher support to lower support from coaches, family, and friends. Those in the two most supported profiles were found to have significantly higher levels of social identification towards their sports team. Social support has been shown previously to have an important role in protecting individuals from the effects of burnout, with social identification found to mediate this relationship (Avanzi et al., 2018; Cahyono et al., 2023; Glandorf et al., 2022; Murray et al., 2023). Examples from domains away from sport and exercise are broadly in agreement with the findings that social identification differs across subgroups, and greater identification and social support are associated with improved well-being (Jackman et al., 2023; Manzi et al., 2023; Zhao et al., 2022).

A small number of studies have examined social identity processes using LTA (e.g., Albarello et al., 2018; Kälin et al., 2023; Xie et al., 2022). A study by Xie and colleagues (2022) examined burnout latent profiles in the context of resource factors that included teachers' professional identity. The results indicated that teachers' professional identity, along with psychological capital, predicted latent profile membership, where the risk of being in the most maladaptive burnout profile decreased and the likelihood of being in the most adaptive increased as professional identity strengthened. Moreover, teachers were more likely to transition to a more adaptive profile than a maladaptive profile between time 1 and 2 because professional identity helped to reduce the occurrence and avoid situations that worsen burnout symptoms. Additionally, the number of profiles and the distribution of profile mean scores remained stable between time 1 and 2. While profile membership was observed to be less stable, those in the most adaptive latent profiles (i.e., low or no burnout) were most likely to remain in the same subgroup. Similarly to LTA studies from the SDT literature, when transitions did occur, they trended towards more adaptive profiles.

Thus, studies that have adopted a person-centred approach have helped in developing understanding of group processes and motivation, through comparing differences in underlying

subgroups that exist within a population. In doing so, these studies have highlighted the multifaceted nature of group processes and motivation in ways that variable-centred approaches often cannot, especially when extending to longitudinal analysis. In the next section, the literature focuses on studies adopting the unified approach through explicitly or implicitly studying aspects closely connected to the SIA and SDT frameworks.

2.5 A Unified Approach to Motivation and Group Processes

The SIA and SDT frameworks outline various aspects of human behaviour in the context of social environments. There are several criticisms levelled at both, and to overcome these issues, there have been tentative steps made towards creating a more unified approach that draws on the strengths of each framework. SDT acknowledges and outlines the important role that social contexts and interactions have in explaining individual motivation and associated behaviours. However, it is widely accepted that these explanations are too broad and do not offer an explanatory framework for fully understanding how group processes are organised within the self (Legault & Amiot, 2014). In addition, the theory is arguably restricted to explaining social contexts that involve interpersonal and intragroup interactions. More recently, there have been several studies that have addressed this shortcoming and aim to extend SDT through the use of the SIA, which are outlined in this section.

The literature on the SIA typically offers little to no definition for the concept of motivation and, as a consequence, motivation is often treated as a unitary construct (e.g., De Cuyper et al., 2016; Mertens et al., 2020; Stevens et al., 2023). There are some exceptions (e.g., Ellemers et al., 2004; Hogg, 2000, 2001; Van Knippenberg, 2000), but the work does not appear to have been widely adopted by other researchers. Moreover, the focus within the SIA literature has been on understanding the drivers that determine group behaviour, such as identifying with a group or strategies for improving social status.

2.5.1 Motivation, Basic Psychological Needs, and Social Identity

There has been a dearth of empirical research supporting the adoption of a unified approach to group processes and motivation. The studies that have attempted to bridge the divide have done so for the purpose of improving the explanatory powers of the two frameworks (Kelley & Alden, 2016). The lack of unified studies has culminated in literature focused on varying theoretical concepts from each framework whilst also adopting various methodologies applied to various domains. Notably, there are only a handful of studies from the domains concerned with physical

activity and performance (e.g., Ntoumanis et al., 2017; Strachan et al., 2012).

This has meant that findings that support a unified approach lack substantive support from follow-up studies attempting to replicate findings. The issue primarily affects the SDT framework and is likely related to its number of component subtheories. For instance, in some scenarios the focus is on motivation to identify (e.g., Amiot & Sansfacon, 2011), on collective BPN satisfaction (e.g., Thomas, Amiot, et al., 2017), comparisons of collective and personal autonomy (e.g., Kachanoff et al., 2019), and the role of BPN satisfaction in the social identification process (e.g., Greenaway et al., 2017). Whereas, across the breadth of unified approach research, the operationalisation of social identity is much more consistent and often measured through self-report of participants' level of identification to a group (e.g., Amiot et al., 2010).

The SDT and SIA frameworks were utilised in an attempt to understand the reason why gamers persist in playing computer games for little reward (Neys et al., 2014). Where this study differed greatly from the remaining unified literature was in using the motivational continuum and BPN to understand how these interact with social identity to mediate persistence. As gamer identity strength increased, this corresponded with experiencing increases in each of the BPN, more self-determined forms of motivation, and decreased amotivation. Consequently, persistence was greatest in those gamers who reported a stronger gamer identity.

This study demonstrates an important point. Introducing social identity provides additional contextual information in understanding persistence than would otherwise be possible by applying SDT alone. Moreover, in situations where individuals are likely to report a strong shared social identity, a measure of group identification might not offer the sensitivity to differentiate individual group members. Thus, the introduction of measures of individual differences, such as motivational factors, provides an opportunity to identify differences and begin to explain why such differences exist (Greenaway et al., 2017).

In a similar approach, an unpublished study by Schertzinger, Neville, and Ozakinci (2021) examined the well-being of runners during a coronavirus pandemic lockdown in the UK. They compared individuals with a shared runner identity with those who were members of a running club. During the lockdown those associated with a running club decreased their levels of running, which was hypothesised to be because group-based activities were not permitted. Individuals not associated with a particular club typically experienced a greater sense of a shared runner identity and, consequently, were more likely to persist in running during lockdown and experience higher

levels of mental well-being. Those with a shared runner identity also reported higher levels of competence, which also predicted greater levels of physical activity and well-being. As was the case in the previous study, perceived competence and group membership were associated with improved outcomes, including persistence and mental well-being. Furthermore, both studies showed that despite the lack of physical group interaction, a shared psychological connection is still possible and reflects the relevance of higher-order social categories (Neys et al., 2014; Schertzinger et al., 2021).

A recent study by Yip, Thomas, Amiot, Louis, and McGarty (2023) examined the psychological factors of sustained collective action in global poverty. The findings indicated that autonomous forms of motivation predicted long-term participation, whereas controlled forms undermined it. Social identification played a reciprocal role in reinforcing autonomous motivation. As identification strengthened, motivation became more internalised, fostering greater engagement. Crucially, satisfaction of basic psychological needs mediated the relationship between motivation and identification by ensuring that activism was experienced as meaningful, empowering, and socially connected. Strategies focused on intrinsic commitment and shared identity enhanced sustained activism, whereas reliance on external rewards hindered long-term participation. Thus, this research emphasises that collective action is not merely an outcome of social identification but is deeply intertwined with personal motivation. By creating supportive conditions that enhance autonomous forms of motivation, movements can develop resilient networks of committed individuals who remain engaged despite challenges.

Another study examined how SDT might apply at the group level considering motivation and autonomy in collective terms (Thomas, Amiot, et al., 2017). Across three studies, the authors found that group helping by the Australian people was associated with behaviour being increasingly seen as self-determined, personally and collectively, which led to improvements in pride and well-being. This contrasted with representative helping by the Australian government that was found to undermine outcomes of well-being and group pride. Interestingly, when individuals engage in behaviours as individuals rather than collectively, reported self-determined motivation was at its greatest. However, it was as part of a group that individuals reported greater levels of well-being, behavioural support for the outgroup, and pride.

The previous studies considered motivation and BPN at the individual-level and reflect the paucity of research that explicitly draws on these two factors when adopting a unified approach. The SIA literature provides support for the notion that group membership can lead to

improvements in well-being (e.g., Gray et al., 2018; Haslam et al., 2016) and may help to explain the differences observed in individual and collective outcomes. The authors suggested that in the context of intergroup helping, group members are more likely to respond out of necessity even when motivation is reported to be less self-determined and driven by external factors, such as helping because it is the right thing to do (Thomas, Amiot, et al., 2017). This important nuance would not be possible without the introduction of the SDT framework.

Both the SDT and SIA frameworks were brought together to examine the phenomena of fans' derogatory behaviour (Amiot et al., 2014). Social norms were introduced as a second intergroup process to examine the extent to which social norms and social identification predict self-determination. This particular scenario differs somewhat from previous studies in this section as it introduces intergroup competition that is inherent in sports. Overall, hockey fans' level of identification with their team directly affected the acceptance of the social norms and and led to motivation that was more self-determined for engaging in derogatory behaviour towards rival fans. Moreover, this interaction was also found to influence the frequency with which ingroup members engaged in derogatory behaviours and was independent of whether the behaviour was framed as harmful or not. Importantly, these associations were only observed when fans identified strongly with their hockey team.

The findings from this study differed from those found in earlier studies that also examined harmful behaviours within the context of a unified approach (Amiot et al., 2012, 2013). In these earlier studies, group members showed greater intentions to engage in harmful behaviours towards an outgroup when the social norms favoured doing so. However, when intention to engage in harmful behaviour was reported, this was associated with lower self-determined motivation. Conversely, individuals who intended not to engage in harmful behaviours reported more self-determined motivation for this action. This finding was argued to align with the SDT framework that indicates that harmful behaviours are more difficult to internalise. The authors suggested that social identification was the key determinant in explaining why harmful norms were and were not internalised across the three studies. They hypothesised that the situational manipulations in the earlier studies differed markedly from the well-established and historic nature associated with being a fan of a hockey team. Thus, while social identification was seen as being a key determinant in the ability to identify the most and least self-determined behaviour, it also played a significant role in explaining why harmful behaviours were or were not internalised.

Amiot and Sansfacon (2011) set out to understand the different reasons why individuals were motivated to identify with an ingroup and what outcomes were associated with experiencing certain types of motivation (e.g., patriotism, vitality, nationalism, identity conflict). Moreover, the research aims were predicated on the assumption that social identity was motivated by a desire to attain positive distinctiveness for an individual's ingroup, which is often accompanied by ingroup favouritism (Tajfel & Turner, 1979). The introduction of motivation that focuses on quality rather than quantity is argued to offer a means of accessing the different dimensions of social identity that would otherwise not be distinguishable (Amiot & Sansfacon, 2011). This enabled the positive and negative outcomes to be aligned with the different types of motivations described in the SDT.

The main finding indicated that identifying with a group for self-determined reasons predicted positive outcomes, and non-self-determined motivation predicted negative outcomes. Yet, the most positive outcomes were associated with being partially self-determined (i.e., identified motivation). Previous research also supports the notion that whilst self-determined motivation might be viewed as the optimal type of motivation, this is not the case in all situations (Koestner et al., 1996; Teixeira et al., 2012).

A study by Yampolsky and Amiot (2013) offers a different perspective on the debate of adopting a unified approach. The main finding indicated that strength of identification was the only factor that directly affected well-being and ingroup bias. Motivation to identify did not predict well-being nor mediate the relationship between identification and the other outcomes. The authors suggested this might have been related to the weak priming effects for self-determined and non-self-determined motives for identifying. Thus, the weak relationships to motivation are understandable when contrasted against using a regional identity (i.e., Quebecois versus other Canadian provinces) that would likely elicit a strong degree of identification. Furthermore, it was hypothesised that group membership may be sufficient to provide the benefits to well-being above and beyond the motives to identify. Recent evidence on the quality and quantity of group memberships gives some support to this point (Haslam et al., 2016). This study also highlights the importance of being able to assess self-determined versus non-self-determined motivation.

2.5.2 Basic Psychological Needs and Social Identity

The remaining studies rely solely on BPN and social identification within the unified approach. Greenaway and colleagues (2017) examined whether BPN satisfaction facilitated the development of identity formation and well-being mediated by social identification. Australian

university students were sampled early in their university careers and followed up six weeks later (Greenaway et al., 2017). Students' levels of BPN satisfaction and social identification with their university, well-being, and academic satisfaction were measured at both time points. Using a modelling approach, BPN satisfaction was found to be associated with higher identification, which subsequently mediated higher norm conformity and lower identity conflict. Well-being and academic satisfaction were directly predicted by BPN satisfaction at the initial time point. When incorporating follow-up data, the model was modified to capture changes in each variable. Within this model, significant changes in BPN satisfaction indirectly predicted increased well-being and academic satisfaction, and decreased identity conflict mediated by student identification.

Thus, an improvement in reported BPN satisfaction was associated with a positive change in the student's sense of social identification with their university. Therefore, when individuals' self-determination needs are satisfied in the context of a specific group membership, they are more likely to identify with that group. Further improvements were observed in personal well-being and academic satisfaction. The authors suggested that the findings highlighted the important contribution of incorporating group processes into interventions based on SDT to further support educational adjustment and outcomes.

Amiot, Terry, Wirawan, and Grice (2010) examined how individuals manage the integration of new social identities when becoming members of new social groups whilst also understanding the role played by social support and BPN satisfaction in this process. Additionally, the research also observed changes over time in terms of adjusting to new group membership. Across two studies, support was found for a newly developed model whereby coping and adaptation processes (e.g., inclusion efforts, positive affirmation) at time 2 mediated the relationship between social factors at time 1 (i.e., BPN satisfaction and social support) and change in social identity between time points. The latter also acted as a mediator to the outcome variable change in positive emotions.

The findings indicated that social identification was predicted to increase among group members when a group was perceived to generally satisfy BPN and provide social support at time 1. This relationship was significantly and most strongly mediated through positive affirmation and, to a lesser extent, inclusion efforts, both of which were group-level processes. Thus, providing social support and BPN satisfaction predicted the type of coping strategies used to manage the transition period. This led to individuals' better management of the integration process involved in joining a new community and improved attempts to assimilate into the group.

Notably, individual-level coping strategies as a mediator were found to significantly predict changes in social identification only when group-level coping strategies were excluded from the model. When group-level coping strategies were included they alone significantly predicted changes in social identification. This finding emphasises the importance of attending to both group and individual-level factors. However, given that this study focused on BPN satisfaction as a combined component, it is impossible to draw any further conclusions on the specific role of each BPN within this context. However, the longitudinal design provides a unique perspective which enables intra-individual changes to be assessed over time rather than the limitations evident in the cross-sectional designs of other unified research. There is a clear need for future research to adopt longitudinal designs to better capture the possible dynamic relationship between motivation and social identification.

In a novel approach, Chatzisarantis, Hagger, Wang, and Thøgersen-Ntoumani (2009) attempted to extend the theory of planned behaviour (Ajzen, 1991) within the context of the unified approach. The findings suggested that significant others (i.e., physical activity teachers) were likely to have greater influence over young people by providing autonomy-supportive information, rather than controlling, about physical activity, regardless of whether they identify with their peer group. In addition, group norms predicted physical activity engagement and attitudes but only for individuals who strongly identified with their ingroup. Unlike in the previous study (e.g., Amiot et al., 2010), the roles of social identification and autonomy support were independent of each other, which demonstrates the inconsistencies inherent in this area of research caused in part by varying methodologies and research aims. The findings provide some initial supporting evidence of how this unified approach might be extended to other theoretical frameworks. However, the primary goal should be to strengthen the current evidence base associated with bringing together SDT and the SIA through the use of more consistent research methods.

Leduc, Boucher, Marques, and Brunelle (2024) examined the relationships between team identification, college athlete's satisfaction of BPN, and the relational quality between a coach and athlete. Using self-reported data from 319 college athletes, the findings revealed that team identification was positively associated with the satisfaction of the needs for competence and relatedness, while coach-athlete relationship quality was positively associated with the satisfaction of the needs for competence and autonomy. Additionally, coach-athlete relationship quality moderated the relationship between team identification and the satisfaction of the needs for

competence and relatedness, demonstrating that a strong coach-athlete relationship amplified the benefits of team identification. These findings provide further evidence that attending to both satifaction of BPN and team identification can help to facilitate athletes' psychological well-being and development.

2.5.3 Alternative Theoretical Examples

There are other studies that draw on similar concepts to motivation or group processes that offer useful insights that will be briefly discussed in this next section. Greenaway, Cruwys, Haslam, and Jetten (2015) examined how social identity strength was associated with global psychological needs being satisfied. This relationship was further examined in the context of direct and indirect mediation pathways to depression. While this study focuses on a set of conceptually different psychological needs, there were clear similarities with the BPN of autonomy, competence, and relatedness. Across the three studies, the main finding indicated that as identity strength increased, there was a corresponding increase in satisfaction with each global need. Furthermore, the satisfaction of each global need was found to mediate the relationship between social identity strength and depression. Each global need was found to be equally important in mediating this relationship. Moreover, the findings extend previous explanations of how social identity processes enhance well-being to include the mediating role of, in this case, global needs satisfaction. Other studies have focused on specific cognitive factors or multiple group membership (e.g., Cruwys et al., 2014; Sonderlund et al., 2017).

Bettencourt and Sheldon (2001) explored how social roles (e.g., a set of standards for the behaviours of a particular social position), which are typically subsumed within the SIA, can satisfy BPN and enhance well-being. The main finding from this collection of studies was that feelings of autonomy in their social roles were positively correlated with experiences of relatedness. This finding is somewhat in contrast to the independence of the BPN found in other studies (Greenaway, Cruwys, et al., 2015). Greater satisfaction of autonomy and relatedness was associated with enhanced well-being. Similarly to the previous study (Greenaway, Cruwys, et al., 2015), autonomy and relatedness were both significant predictors of well-being, suggesting that these two BPN can work in tandem rather than being opposed. Competence was also found to be derived from participants being able to experience their social roles as autonomous and affording feelings of relatedness.

Sheldon and Bettencourt (2002) compared and contrasted needs from SDT and optimal

distinctiveness theory (Brewer, 1991), and their effect on well-being in the context of informal and formal group membership. Broadly, all five needs were associated with positive outcomes (i.e., positive affect, group commitment) but only autonomy and relatedness satisfaction were linked with lower negative affect. Furthermore, formal and informal groups were found to be equally happy and committed, but differences existed in autonomy, personal distinctiveness, and group distinctiveness. Formal group members felt less autonomy, less personal distinctiveness, and more group distinctiveness, with the opposite pattern observed in those who were members of informal groups.

A more recent area of work related to the SIA involved applied research developing what is known as the 5R (i.e., reflecting, representing, realising, readying, reporting) leadership program (Fransen et al., 2020, 2022; Haslam, Reutas, et al., 2023; Haslam et al., 2017; Mertens et al., 2020; Slater & Barker, 2019). The aim of the program is to move away from developing leaders' leader identity (i.e., personal identity) and shift the focus onto leaders' social identity (Haslam, Reutas, et al., 2023). The development of this program has been entirely couched in the SIA framework. However, some research has drawn on concepts from SDT (e.g., Fransen et al., 2020, 2022). The initial trials of this program have generally found it to be successful in fostering leader and group team identity (Fransen et al., 2020, 2022; Haslam, Reutas, et al., 2023; Mertens et al., 2020; Slater & Barker, 2019). Additionally, the program has also been found to improve motivation (Haslam, Reutas, et al., 2023; Mertens et al., 2020; Slater & Barker, 2019), team unity (Fransen et al., 2020), well-being (Mertens et al., 2020), and found a dose-response effect of program engagement (Haslam et al., 2017).

Yet, a key aspect of the 5R program is focused on developing leaders' ability to engage with their team through support (i.e., realising) and providing some degree of feedback (i.e., reinforcing). Two aspects that could be directly or indirectly associated with providing support for BPN. This has been demonstrated in two studies that used nearly identical methodologies but different theoretical lenses to interpret the results (Fransen, Vansteenkiste, et al., 2018; Fransen et al., 2015). The studies examined the effect of team leader support or discouragement on a passing task and a dribbling–shooting task. The main finding across both studies demonstrated that positive feedback from an athlete leader improved team performance.

In a longitudinal approach, Ntoumanis and colleagues (2018) examined the relationship between exercise identity and the varying types of motivation. In this study, exercise identity was conceptualised through identity theory as opposed to the social identity approach (e.g., Stets &

Burke, 2000). While there has been discussion concerned with the broad conceptual overlap between the two theories, it will not be addressed in this discussion (Hogg et al., 1995; Stets & Burke, 2000). However, the concept of exercise identity was defined as the extent to which the role of an 'exerciser' forms a core part of an individual's self-concept. Overall, the more self-determined forms of motivation were found to increase over the course of the six months of the study, as did exercise identity. The least self-determined forms of motivation decreased over the same period. The main finding indicated that those who experienced self-determined motivation were significantly more likely to observe positive changes in exercise identity. Additionally, exercise beliefs (e.g., "I need to exercise to feel good about myself"), which contribute towards exercise identity, were found to have a reciprocal relationship with the more self-determined forms of motivation. The final study examined the role of coaches in providing support for BPN, the perceived organisational justice (i.e., the role of fairness), and the role of team identification in mediating outcomes for athletes in a team setting (De Backer et al., 2011). The study demonstrated that team identification led to ingroup bias, which was associated with improving intragroup cohesion. More importantly, the results showed that when a coach was perceived to support autonomy, competence, and relatedness, this was positively associated with increased team identification for the athletes.

2.6 Summary of the Unified Literature

The integration of SDT and the SIA offers a promising, albeit underdeveloped, avenue for understanding motivation within group contexts. The findings presented in this chapter provide support for a reciprocal relationship where stronger social identification is associated with greater satisfaction of BPN and more autonomous forms of motivation. Consequently, this relationship contributes positively to outcomes like persistence and well-being. In addition, environments that satisfy BPN foster stronger social identification, which in turn mediates positive changes in well-being, academic satisfaction, and smoother integration into new groups. This unified perspective suggests that social identity provides crucial context for understanding motivation, while SDT offers a way of determining the quality of motivation often overlooked in SIA, including the motivation to identify itself, which can predict distinct positive or negative outcomes.

However, the literature also highlights complexities and inconsistencies. Strong identification can facilitate the internalisation of group norms, potentially leading individuals to perceive even socially normative negative behaviours as self-determined, with context influencing this process significantly. While the quality of motivation to identify often matters, some studies

find identification strength alone predicts well-being. Furthermore, group-level factors, such as BPN support from leaders and social support structures, significantly predict identification and subsequent outcomes. The field suffers from limited empirical work, methodological inconsistencies, and a lack of replication studies, underscoring the need for more rigorous and longitudinal research to fully appreciate the dynamic interplay between BPN, motivation, and social identity processes.

2.6.1 Limitations of the Unified Literature

There are several limitations that undermine the advancement of a unified approach. First, the paucity of empirical research specifically dedicated to bringing together key concepts from SDT and the SIA. Second, this has led to a fragmented body of literature, characterised by considerable variation in the theoretical concepts selected, particularly drawing upon different facets of the SDT framework, and the adoption of diverse methodologies across a wide variety of domains. Notably, certain fields, such as physical activity and performance, exhibit only a handful of investigations attempting this integration (e.g., Saward et al., 2024). Third, this inconsistency contributes to divergent findings across studies and means that conclusions supporting a unified perspective often lack substantive support from follow-up or replication studies, thereby yielding a less robust evidence base.

Fourth, further compounding these issues are prevalent methodological weaknesses within the existing research landscape. Many studies rely heavily on cross-sectional designs, which inherently limit the capacity to capture the dynamic interplay between motivational, identity, and group processes over time, underscoring a clear need for more longitudinal research (e.g., De Backer et al., 2011). Fifth, the operationalisation of key constructs presents challenges; while social identity is often measured relatively consistently through self-report identification (e.g., Amiot & Aubin, 2013), the application and measurement of SDT concepts varies considerably. For instance, inconsistencies in conceptualising BPN as either a global construct or as separate components is prevalent within the unified literature (e.g., Greenaway et al., 2017). When studies do adopt an approach that treats BPN as a global construct this prevents detailed analysis of the distinct contributions of autonomy, competence, and relatedness. This reflects a broader paucity of comprehensive integration, with many studies focusing selectively on either motivation or BPN in relation to social identity, rather than explicitly drawing upon the synergistic potential of both frameworks simultaneously.

2.7 Chapter Summary

The collection of studies presented in this section offers a solid foundation that supports adopting a unified approach, bringing together the SIA and SDT frameworks. However, for this area of research to progress proponents of each framework need to show a willingness to incorporate competing theories. More recently, one of the originators of the SDT, Richard Ryan, co-authored a paper that appears to be one of the first direct acknowledgements of how the competing framework of the SIA might be of benefit (Martela et al., 2021). Yet, in an earlier paper, there has been a more implicit argument for SDT concepts to be applied to explanations for the reasons why people endorse their identities (Ryan & Deci, 2003). There is also some tentative acknowledgement from social identity proponents that the SDT framework might, under certain circumstances, be better suited to answer specific research questions (Platow & Grace, 2020). However, this is countered by warnings about adopting a unified approach because the two frameworks are argued to be based on incompatible assumptions primarily centred around conceptualisations of the self (Platow & Grace, 2020).

Other SIA proponents have adopted the nomenclature of the SDT framework by distinguishing between the least (e.g., external) and most self-determined (e.g., intrinsic) forms of motivation without taking advantage of the qualitatively and phenomenological distinct descriptions that underpin the regulatory types (e.g., Greenaway et al., 2020; Mertens et al., 2018). Clearly, from the perspective of proponents of the SIA several barriers are arguably insurmountable (Greenaway et al., 2020; Platow & Grace, 2020). Notably, critics of the SDT tend to focus on providing only a brief overview of the key concepts (Greenaway et al., 2020; Stevens, Cruwys, et al., 2020) and, in doing so, neglect to cover the rich and detailed theoretical discussions on developmental (e.g., Deci & Ryan, 2012), personality (e.g., Ryan, 1995), and social context (e.g., Deci & Ryan, 2012), which only goes to serve their criticisms. Strikingly, it has taken 30 years of empirical work for the originators of each framework to explicitly acknowledge the existence and possibility of integrating the corresponding framework (Haslam, Boen, & Fransen, 2020; Martela et al., 2021; Stevens, Cruwys, et al., 2020). Thus, conducting research that straddles differing theoretical frameworks will face challenges from proponents of competing theories. It is only through continued empirical research that such critiques can be challenged or accepted. This thesis aims to add to the ongoing debate of a unified approach, as summarised in the next section.

The SIA and SDT frameworks stand as prominent theories within their respective fields of

intergroup processes and motivation. In particular, the SIA has provided significant and critical advancements to psychological theory in explaining the processes that govern group membership and, more importantly, predictions on the way behaviour stems from being a member of a group (e.g., Ellemers et al., 2004). In contrast, the SDT has put forward a broad explanation of human motivation that provides a rich and detailed description of differing degrees of motivation. It has significantly expanded psychological theory by describing how motivation can be experienced as increasingly internalised and integrated as part of the self but also the importance of social environments in fostering the conditions that support the internalisation and integration process (e.g., Mossman et al., 2022).

Researchers have moved to take advantage of the underlying strengths of each framework by adopting a unified approach, albeit this remains a niche area of research. Yet, the relatively small number of studies discussed in this chapter has demonstrated success in unifying the two frameworks and argued to offer a more complete and complex explanation for group processes and motivation (Neys et al., 2014; Schertzinger et al., 2021; Thomas, Amiot, et al., 2017). This is because results have contributed to our understanding of: (1) the importance of capturing and ability to determine the dimensions of social identity (Amiot & Aubin, 2013; Amiot & Sansfacon, 2011); (2) the contextual determinants of social identification (Neys et al., 2014); (3) the relevance of considering collective and personal self-determined behaviour (Thomas, Brown, et al., 2017); (4) how self-determined motivation to identify with a group operates (Amiot & Sansfacon, 2011; Ryan & Deci, 2003; Yampolsky & Amiot, 2013); and (5) the longitudinal nature of social identification associated with supports for BPN (Yampolsky & Amiot, 2013). Consequently, these findings extend to improving predictions on the consequences of group behaviour (Amiot & Aubin, 2013). Thus, the unified approach literature has provided an original contribution to considering motivation and group processes and, consequently, laid the groundwork upon which future research can build. In particular, this thesis will contribute to the unified approach literature in a number of key ways.

First, notwithstanding the current literature that has applied key concepts from both frameworks, research to date has lacked a comprehensive examination of both frameworks. Those studies that have attempted to incorporate measurements of motivation and BPN have been limited in some way (Neys et al., 2014; Schertzinger et al., 2021; Thomas, Amiot, et al., 2017). For instance, the study by Thomas and colleagues (2017) measured self-determination as a bipolar structure as either being self-determined or non-self-determined. This method of classifying motivation negates

the underlying regulatory forms that enrich the study of motivation. Thus this thesis will improve on previous research by drawing on the full range of core concepts from the SDT and SIA.

Second, the SIA states that it is social identification that makes group behaviour happen (Turner, 2010). Within the unified approach literature, motivation has typically been applied to the identification process rather than the behaviour that a group will engage in (e.g., Amiot & Sansfacon, 2011). Neys and colleagues (2014) provide the only example of classifying behaviours aligned to the motivation continuum and, therefore, is an underdeveloped area. Adopting measures of motivation, BPN, and social identification that reflect the full range of the core concepts offers the opportunity to better differentiate the positive and negative outcomes regarding well-being and performance. Moreover, the focus will be on understanding an individual's assessment of their own behaviour in relation to their group membership.

Third, findings from the SIA typically indicate that improvements in well-being are associated with the strength of social identification with a particular group (e.g., Haslam, Lam, et al., 2023). The unified approach literature has a number of studies where well-being was considered (e.g., Amiot & Aubin, 2013; Thomas, Amiot, et al., 2017; Yampolsky & Amiot, 2013). Yet, these findings relate to either motivation to identify or simplified classification of motivation (i.e., most self-determined versus least self-determined). Also, in some cases, the findings have failed to show any benefit in the prediction of well-being by the inclusion of core concepts from the SDT (e.g., Yampolsky & Amiot, 2013). Thus, this research will uniquely assess group members' motivation for engaging in specific behaviours and subsequent experiences of well-being. This also extends to performance as an outcome, which is an area that has yet to be investigated in the unified literature.

Fourth, the longitudinal nature of social identification and the interaction with core concepts from the SDT framework is also an underdeveloped area of research. To date, there have been few attempts (e.g., Amiot et al., 2010; Kachanoff et al., 2019). For instance, when a longitudinal approach was taken, it provided a unique perspective which enabled intra-individual changes to be assessed over time rather than the limitations evident in the cross-sectional designs of other unified research (Amiot et al., 2010). There is a clear need for future research to adopt longitudinal designs to better capture the dynamic nature of motivation and social identification. Thus, this thesis attempts to fill the gap that currently exists in the unified literature by adopting a longitudinal approach whilst accommodating the other areas of interest outlined above.

Lastly, it has been suggested that intergroup processes have been neglected by the majority of the unified literature (Kachanoff et al., 2019). Where intergroup processes have been incorporated, they have tended to be indirect measures and lack any direct effect on the individual or group members being assessed (e.g., Amiot & Sansfacon, 2011). The final aim of this thesis was to examine the effect of introducing intergroup competition from the perspective of the unified approach.

2.8 Thesis Aims

In sum, the broad aims of this thesis were to build on previous research that has adopted a unified approach, contributing to this area of knowledge in several key ways by exploring: (i) possible relationships between key concepts of the SDT (e.g., relatedness) and SIA (e.g., social identification) frameworks; (ii) the effects of incorporating core concepts of the SDT and SIA on measures of performance and well-being; (iii) the combined effects of support for BPN and social identification; (iv) the longitudinal relationship of the core concepts of SDT and SIA; and (v) within the context of performance-based settings (i.e., workplace, sport).

2.8.1 Summary

In Chapter 2, the relevant literature was reviewed in relation to the two main frameworks that underpin this thesis: the SIA and SDT. This included a substantive and growing evidence base that supports the theoretical basis of each framework. Within this literature were numerous examples that demonstrated the positive outcomes, such as improved well-being or physical activity engagement, associated with reports of self-determined motivation or strongly identifying with a particular group. The chapter concluded by reviewing the limited literature that has adopted a unified approach, which provided unique insights into the interplay between the core concepts from each framework. The next chapter will outline the theoretical underpinnings of the SIA and SDT frameworks whilst outlining the key concepts that will be drawn on to achieve the aims of this thesis.

3 THEORETICAL FRAMEWORK

3.1 Introduction

In the previous chapter, the empirical evidence for the social identity approach (SIA) and self-determination theory (SDT) frameworks were reviewed. Broadly, positive outcomes were associated with stronger social identification (e.g., Wegge & Haslam, 2005), more autonomous forms of motivation (e.g., Weinstein & Ryan, 2010) and social environments that promote basic psychological need satisfaction (e.g., Mossman et al., 2022). Yet, there exists a small body of research focused on bringing together these two frameworks in a unified approach to group processes and motivation (e.g., Amiot et al., 2020). Whilst this literature is relatively sparse in comparison to the individual frameworks, the work that has been conducted has identified several key factors that extend and improve each framework's explanatory powers. This includes the dimensions of social identity (e.g., Amiot & Aubin, 2013); determinants of social identification (Neys et al., 2014); collective and personal self-determined behaviour (Thomas, Brown, et al., 2017); self-determined motivation to identify (e.g., Amiot & Sansfacon, 2011); and the longitudinal nature of social identity and self-determination (Yampolsky & Amiot, 2013). In this chapter, the underlying theory of the SIA and SDT frameworks will be discussed in greater detail. Particular attention will be paid to the main propositions underpinning the studies discussed in this thesis. There will be a discussion of several key criticisms for each framework and, where possible, outline how this thesis can contribute to resolving these issues. The first section details the main components of SDT.

It is worth briefly outlining the rationale for selecting the SIA and SDT frameworks over alternative theories. These include motivational theories such as social cognitive theory (Bandura, 2001), learned helplessness (Seligman, 1972) and operant conditioning (Skinner, 1937)); and theories of group dynamics include cohesion (Carron et al., 1985), social dominance theory (Sidanius et al., 2004), and integrated threat theory (Stephan et al., 1999).

In the case of cohesion (Carron et al., 1985), this theory has received significant empirical support in applied sports and exercise settings. However, cohesion is argued to lack the ability to explain the psychological processes that underpin a person's reason for choosing to be a member of a particular group over another (Beauchamp & O'Rourke, 2020). Within SDT, motivation is defined in terms of different regulatory types, as will be discussed in more detail in this chapter, which differs markedly from other theories. For instance, self-efficacy (Bandura, 2001) defines the

commitment to act in terms of the presence or absence of motivation. This granularity in defining different motivational types is the primary reason for selecting SDT over other theories from psychology. Thus, in both cases, the SIA and SDT frameworks provide a more rich and detailed explanation of motivation and group processes, which offers greater opportunities for closer alignment between the two frameworks.

3.2 Self-Determination Theory

A theory of human motivation, SDT is focused on the volitional aspects of action and emphasises the essential social environment that fosters behaviour (Deci & Ryan, 1985b). The framework is also much more concerned with describing the qualitative aspects of motivation and performance rather than the quantity of effort required to complete a task (Deci & Ryan, 2008). Over time, the framework has continued to develop and offers a more holistic perspective incorporating issues such as well-being, personality development, life goals, self-regulation, and cultural influence (Deci & Ryan, 2008; Ryan, 2009). A core assumption of SDT is the innate tendency of individuals towards psychological growth, healthy functioning, effective social engagement, and wellness (Frederick & Ryan, 1995). Consequently, under optimal conditions, humans will tend to exhibit an innate curiosity and desire to engage in interesting activities whilst also demonstrating their capability in these activities. Whether these outcomes are experienced positively or adversely is greatly influenced by a broad range of biological and social determinants. Although SDT is primarily interested in the social factors that promote or undermine the tendency towards inherent psychological growth (Deci & Ryan, 1985a; Deci & Ryan, 2002).

More broadly, the SDT framework has developed and grown over the course of several decades and currently consists of six subtheories (Ryan, 2023). Each component speaks to a different phenomenological experience involved in the process of intentional action. Basic psychological needs (BPN) theory describes the essential human needs for autonomy, competence, and relatedness, and the consequence of these being satisfied or deprived. Cognitive evaluation theory describes the social processes involved in determining intrinsic motivation. The integrative theory of organisms describes the development of extrinsic motivation through integration. Causality orientation theory is concerned with individual differences that develop due to the interactions of a person with their social environment. Goal content theory concerns the relationship between aspirational goals and needs satisfaction. Lastly, relationship motivation theory describes the interplay between the BPN for relatedness and autonomy within the context of

interpersonal and intragroup relations.

Not all the sub-theories align with the general aims of this thesis and, consequently, are not discussed beyond this point. These are causality orientation theory, goal content theory, and relationship motivation theory, and whilst they broaden the scope of the wider framework, the core assumptions are less relevant to the aims of this thesis. Currently, these subtheories are either less established than the other subtheories or lack supporting empirical evidence (e.g., Hagger & Hamilton, 2021). Given that these subtheories are further complicated by being couched in issues of individual difference, the enduring characteristics and traits that determine individuality, they are markedly different to the remaining subtheories. In the next section, the BPN, a set of central pillars that many of the subtheories are anchored to, are briefly outlined to help contextualise the subsequent discussion of each subtheory.

3.2.1 Basic Psychological Needs

Within the SDT framework, the BPN for autonomy (i.e., feel a sense of personal initiative), competence (i.e., to function effectively), and relatedness (i.e., feeling connected to others) are specified as being central to healthy emotional and mental well-being with there satisfaction or frustration facilitating the type of motivation experienced (Deci & Ryan, 2002). Thus, the BPN are positioned as comparable to other core needs, such as physiological and safety needs (Maslow, 1943), argued to be necessary for sustaining life (Deci & Ryan, 2015). Consistent with unmet physiological needs, psychological damage can result when BPN are not met (Ryan & Deci, 2000b).

Thus, given the importance of BPN as fundamental nutrients required for healthy functioning, it is unsurprising that the needs for autonomy, competence, and relatedness influence many parts of the SDT framework. Furthermore, the empirical findings from Chapter 2 highlighted the influence of an individual's social environment in facilitating satisfaction of each BPN (e.g., Ntoumanis et al., 2021). More specifically, the support provided by important social agents within a person's life, such as coaches, peers, and parents, has been found to be responsible for facilitating or undermining the satisfaction of BPN (e.g., Edmunds et al., 2006; Mertens et al., 2018).

The need for autonomy refers to a capacity to regulate behaviour involving a sense of volition and in accordance with a person's internal values, beliefs, and interests (Ryan & Deci, 2000a). When this occurs, behaviour is endorsed by the self and reflects integration with other internal values. This contrasts behaviour directed by external pressures, such as coercion (Olafsen et al., 2017; Ryan & Deci, 2000b). That is not to say that external pressures are always experienced

as non-autonomous. In certain circumstances, external pressures can still lead to the satisfaction of autonomy when the target behaviour aligns with the internal values of a person and leads to self-endorsement (Deci et al., 2017).

The characterisation of autonomy relating to volition and self-endorsement has led to misinterpretation and criticism, suggesting that it is not dissimilar to concepts such as independence and control. However, independence does not equate to autonomy within the SDT framework, but rather, those who experience autonomy satisfaction can still depend on interpersonal and intragroup relationships. However, within these relationships, there is also a level of separateness (Deci & Ryan, 1985a; Deci & Ryan, 2002). For example, a person may need support to learn the values of a new social group and find this support through the connection with significant others. This reflects the general principle that BPN depend on supports for satisfaction to occur (Deci & Ryan, 1985b). Autonomy has been deemed to reflect a sign of SDT being entirely individualistic and focused on interpersonal relations, although this has been disputed (Chirkov et al., 2003; Martela et al., 2021). Rather, the social environment has always been a central pillar within the SDT framework because it is seen to facilitate or undermine motivation by supporting versus thwarting people's innate BPN (Deci & Ryan, 1985b).

The need for competence refers to an individual's need to experience a sense of mastery in activities they engage in. This broad conceptualisation does not differ significantly from other prominent theories on motivation (e.g., Bandura, 2001). Where SDT differs from other theories is the importance placed on identifying where behaviour originates (Ryan & Deci, 2017b). Whether a behaviour is experienced as originating from internal or external sources will greatly determine how effective a person feels. Thus, it is suggested that when a behaviour is initiated from within the person, they will be more likely to develop an authentic sense of competence. Experiencing competence in this way can energise the behaviours people engage in (Ntoumanis, 2002). Equally, competence can easily be frustrated by various internal and external sources, such as participation in activities that are too challenging to master (Mageau & Vallerand, 2003).

The need for relatedness refers to the degree to which individuals feel connected, involved, and interdependent to a particular social group (Deci & Ryan, 2002). When individuals feel cared for, they experience a sense of support, empathy, and understanding from others, which fosters a sense of relatedness. Furthermore, an element of reciprocity characterises relatedness, whereby individuals also need to experience a sense of belonging and positively contribute toward significant

others (Deci & Ryan, 2002; Schuler et al., 2014). This notion emphasises that individuals are passive recipients of care and support and active contributors to the well-being and growth of significant others. Typically with SDT relatedness has focused primarily on close relationships (Martela et al., 2021), which neglects to consider how this basic psychological need is implicated in larger social groups and partly explains why the SDT framework is considered by some to be entirely focused on interpersonal relationships (e.g., Platow & Grace, 2020).

While the relative importance of relatedness in facilitating the experience of self-determined motivation has been contested (e.g., Cox & Williams, 2008; Deci & Ryan, 2000), the satisfaction of autonomy and competence are considered necessary in this process (Deci & Ryan, 2000). This reflects a main tenet of the SDT that each BPN is interdependent (Deci & Ryan, 2000). For instance, autonomy concerns the regulation of behaviour and is central to the other two needs being satisfied (Ryan & Deci, 2017b). Yet, without experiencing competence, an individual's behaviour cannot be perceived as originating from the self, which undermines a sense of autonomy (Ryan & Deci, 2017b). Empirical evidence has also shown that relatedness can also play a central role in certain settings (e.g., Xiang et al., 2017). Thus, the satisfaction of one BPN can and does lead to the satisfaction of all three BPN (e.g., Curran et al., 2016).

3.2.2 Cognitive Evaluation Theory

Explanations of human behaviour have previously argued that external forces are required for action to occur (Ryan & Deci, 2007). Yet, human behaviour can and does often emanate from within the person, engaging in personal development, challenging tasks, and interesting activities for their own sake, such that the reward is inherent in engaging in the activity itself (Ryan & Deci, 2000b). This type of human behaviour that occurs without external forces or rewards is referred to as intrinsic motivation. It is considered to be an innate propensity, emanating from within the organism (Deci & Ryan, 1985a).

The subtheory of cognitive evaluation theory concerns intrinsic motivation and describes the detrimental and facilitative effects of specific types of external events on immediate and sustained motivation (Ryan & Deci, 2000a; Ryan & Deci, 2017b). In general, intrinsic motivation, within the context of SDT, is framed as an inherent tendency towards growth, characterised by individuals seeking challenging and fulfilling activities, whilst also demonstrating capability (Ryan & Deci, 2000a). For intrinsic motivation to be experienced, the reason for engaging in an activity must originate from the self rather than from external sources (Goudas et al., 1994). Yet, as

inherent as the tendency is towards intrinsically motivated activities, there are argued to be numerous social contexts that can derail the experience. Externally administered rewards, such as money, trophies, awards, and adulation, can have detrimental or facilitating effects dependent on how they are perceived by the recipient (e.g., Ryan & Deci, 2000a).

3.2.3 Organismic Integration Theory

The vast array of human activity would not meet the criteria for being intrinsically motivated (Deci & Ryan, 2000). Classically, psychological theories of motivation have conceptualised motivation as a unitary structure. Thus, the lack of intrinsic motivation would suggest someone lacking motivation (Ryan & Deci, 2000b). A major contribution to the development of SDT was to reject the notion of motivation as a unitary structure. Instead, individuals are believed to vary in their degrees of motivation and experience this motivation in different ways (Ryan & Deci, 2000b). Thus, within organismic integration theory are four types of behavioural regulation that are classed as forms of extrinsic motivation: external, introjected, identified, and integrated. Each regulatory form reflects the degree of internalisation and integration associated with an activity and is organised along a continuum that runs from non-self-determined to self-determined (Ryan & Deci, 2000a). Amotivation completes the full continuum and represents the least self-determined behaviour and the lack of motivation or intention to engage in a particular behaviour (Ryan & Deci, 2000a).

Internalisation involves assimilating the values, beliefs, and regulations individuals encounter in their social environments (Deci et al., 1991). The process also involves integrating these external regulations with previously internalised values, beliefs, and behaviours and aligning them with the self (Amiot et al., 2008). Regulations that become fully internalised are highly likely to be consistent with a person's other values and attitudes, leading to a greater sense of autonomy and for behaviour to be experienced as self-determined (Ryan & Deci, 2000a).

A behaviour that is externally regulated is perceived or experienced as resulting from external sources rather than from the self (Deci & Ryan, 2002). The behaviour is contingent on this external source being present and would cease if removed from a person's environment. Persistence of behaviours that are externally regulated presents the major challenge to overcome with this regulatory type (Deci & Ryan, 2000). This type of extrinsic motivation is characterised by an external perceived locus of control, leading to experiences of control rather than autonomy.

Behaviour is less tied to external sources for introjected regulation than external regulatory

style (Ryan & Deci, 2000a). There is a partial internalisation of values and regulations, but the incomplete nature leads to perceptions of control that derive internally rather than externally (Sheldon & Krieger, 2004). This type of motivation is less dependent on external events in a person's environment. Instead, the regulation is intrapersonal and relies on affective and evaluative contingencies that stem from the individual (Vansteenkiste et al., 2004). The primary reason for this regulatory type being experienced as controlling is due to the control being self-imposed through critical evaluations (Ryan & Deci, 2000a).

Identification refers to a form of behaviour regulation in which individuals adopt certain behaviours or goals because they are personally valued (Deci & Ryan, 2000, 2015). This type of regulation is more autonomous and self-determined with a shift to a more internal-perceived locus of control than introjected and external regulations. Importantly, the sense of compliance associated with external and introjected forms of regulation is replaced with perceptions of behaviours that are personally valued (Deci & Ryan, 2015). However, whilst individuals identify with the importance of a particular behaviour, they often do not successfully assimilate this regulation with other values and regulations already internalised (Deci & Ryan, 2000).

Integrated regulation refers to a type of regulation that represents the fullest level of autonomous type of extrinsic motivation. It involves a degree of self-reflection that is missing from other forms of extrinsic motivation to enable behaviour to be more fully internalised (Vansteenkiste et al., 2004). The current values of a person must be congruent with any new behavioural regulations that modify current or previous values to allow the process to occur successfully. Thus, internalisation involves the integration of external factors and values into an individual's sense of self and identity, which leads to the regulations at this level being experienced as authentic (Vansteenkiste et al., 2004).

While both integrated regulation and intrinsic motivation involve internalisation, the primary difference concerns the phenomenological experience of where behaviour originates (Ryan & Deci, 2000a). For integrated regulation, a behaviour occurs because it is perceived to align with a person's values, while intrinsic motivation stems from inherent enjoyment and satisfaction derived from the behaviour itself (Ryan & Deci, 2000a). Another major difference between intrinsic motivation and integrated regulations is associated with the outcomes of engaging in an activity (Gagne & Deci, 2005). For intrinsically motivated behaviour, the inherent enjoyment and interest in doing the task are the reward for participating. For an integrated regulation, the reason for

doing an activity is to achieve some future outcome that aligns with a person's values.

Intrinsic motivation is the most self-determined form of behaviour, while amotivation represents the least self-determined behaviour. It reflects a lack of motivation or intention to engage in a particular behaviour (Ryan & Deci, 2000a). Amotivation is distinct from other motivational orientations and occurs when an individual perceives a complete absence of competence or control over a behaviour and fails to see the relationship between their actions and the desired outcomes. Individuals who are amotivated do not experience any internal or external factors that drive or direct their behaviour, leading to a sense of helplessness or apathy (Vansteenkiste & Sheldon, 2006). Amotivation reflects a disconnection between the individual and the behaviour, with a lack of perceived value or relevance (Deci & Ryan, 2008).

3.2.4 Basic Psychological Needs Theory

The subtheory of BPN theory describes the conditions that lead to need satisfaction or frustration and the subsequent effect on general well-being and ill-being. From the perspective of SDT theorists, well-being is defined in terms that go beyond subjective measures of happiness and health. Instead, SDT is also concerned with describing wellness in terms of thriving or being fully functioning, with happiness being indicative of these criteria. The satisfaction of BPN for autonomy, competence, and relatedness are universal and affect all individuals (Deci & Ryan, 1985a). The consequence of satisfying these needs is optimal development and wellness, while frustration will have the opposite effect. As previously highlighted, wellness indicates that a person is thriving, and this can only occur when satisfaction of each BPN is present. A deficit in just one of the BPN will be likely to cause difficulties (Ryan & Deci, 2017a).

Of the three BPN, autonomy has a unique and important role. In the case of competence and relatedness, satisfaction of these needs can be achieved whether a given behaviour is driven by autonomous or controlled forms of motivation. This is because an individual can feel competent in undertaking an activity or connected to others whether or not the behaviour is being regulated by internal or external forces (Ryan & Deci, 2017a). Satisfying the needs for competence and relatedness is likely to be sufficient for controlled forms of behaviour. In contrast, satisfaction of the need for autonomy is crucial for behaviour to be experienced as self-determined. This is because autonomy satisfaction occurs when behaviour is not being directed by external forces. For instance, when behaviour stems from intrinsic motivation, it leads to the maintenance of emotional and mental well-being, facilitated by the satisfaction of BPN for autonomy, competence, and relatedness

(Deci & Ryan, 2008). All three BPN have a role to play in intrinsic motivation being facilitated and maintained (Ryan & Deci, 2017a).

This section provided an overview of several core assumptions that underpin the SDT framework. Broadly, SDT starts from a position that emphasises the innate tendency of individuals towards psychological growth, healthy functioning, effective social engagement, and wellness. Central to SDT are the three BPN of autonomy, competence, and relatedness. Each need is interdependent on the other needs whilst also having an important role in explaining and determining the type of motivation experienced when acting. When all three needs are satisfied then intrinsic motivation will be more likely to be experienced. In the next section, the focus shifts to the SIA framework.

3.3 The Social Identity Approach

The SIA is a psychological framework that explains the psychology of groups by diverging from the traditional approach focused on studying individual-level factors. Rather, the focus becomes how individuals define themselves in terms of group memberships (Haslam, 2004). The SIA framework comprises two social psychological theories: social identity theory (SIT) and self-categorisation theory (SCT). The theories are viewed as having significant conceptual overlap and compatibility that extends the original social identity theory to better encapsulate the association between self-concept and group behaviour (Haslam, Boen, & Fransen, 2020; Hogg, 2008; Turner et al., 1987).

As a theory of the self (Hogg, 2012), SIT describes how individuals are able to self-define as individuals ("I" and "me") or as group members ("we" and "us"). In both circumstances, the behaviour will be determined by self-definition. When the self is defined in group terms, a person's identity is derived by their social identity (Tajfel & Turner, 1979). When a social identity becomes salient, a core human motivation is for individuals within a group that shares a similar social identity to strive for positive distinctiveness (Stevens et al., 2017; Turner et al., 1987). This is achieved through social comparison, evaluating their own group (i.e., ingroup) against another group (i.e., outgroup). In an attempt to achieve positive distinctiveness, group members can employ strategies dependent on the socio-structural characteristics (Ellemers & Haslam, 2012; Turner et al., 1987).

To more fully explain how group behaviour is made possible through social identification, SCT was developed as an extension to SIT (Rees et al., 2015; Turner et al., 1994). The theory

specifies more fully the conditions that determine a particular social identity becoming more salient and the consequences of this occurring (Haslam, Boen, Fransen, & Reicher, 2020). Together these theories describe how group memberships and the subsequent social identities influence behaviour, beliefs, and emotions (Hogg, 2012).

Proponents of the SIA have long argued that explanations for group behaviour have typically oriented on the personal self and concerns for personal identity (e.g., Haslam, Boen, Fransen, & Reicher, 2020). Therefore, this theoretical viewpoint differs from an individual-level analysis by suggesting that a substantial portion of a person's self-concept comes from group affiliations, which consequently shape their attitudes, behaviours, and cognitive processes (Tajfel & Turner, 1979). Whilst the subtheories of SIT and SCT are interrelated, they are distinct in some crucial ways, which should become clear from the next sections of this chapter.

3.3.1 Social Identity Theory

The initial development of SIT was in light of the findings from the minimal group studies, which demonstrated the influence of intergroup discrimination. However, the theory extends beyond this issue to provide a richer description of intergroup processes. The concept of social identity is defined as "that part of an individual's self-concept which derives from his [or her] knowledge of his [or her] membership of a social group (or groups) together with the emotional significance attached to that membership" (Tajfel, 1974, p.69). Moreover, when people are not only assigned to a group but also take on that group membership as the basis for defining the subjective self there are two key outcomes. First, individuals seek to determine the meaning and standing of the group by making social comparisons between their ingroup and relevant outgroups (Turner et al., 1987). Second, they seek to define their group favourably by differentiating it positively from outgroups along dimensions they value or place their group in a more favourable light (Turner et al., 1987). Thus, individuals strive for their ingroup to be perceived as better than other comparable outgroups, referred to as positive distinctiveness (Tajfel, 1974). This is because individuals are motivated to experience positive self-esteem, and this is achieved when they can positively evaluate their ingroup to be uniquely different from another group on some valued characteristic (Ellemers et al., 2002; Haslam, 2004; Tajfel & Turner, 2004).

Within the SIT, behaviour can reflect either interpersonal or intergroup interactions (Haslam, 2004; Tajfel & Turner, 2004). At the interpersonal level, interactions are governed by an individual's perception of themselves as a unique entity that holds idiosyncratic beliefs, values, and

motivations. This contrasts with intergroup behaviour that stems directly from an individual's group membership. Whether an individual's behaviour is deemed to be occurring at an interpersonal or intergroup level of interaction is dependent on the perceived social and psychological factors in their social system (Haslam, 2004; Hogg, 2012; Tajfel & Turner, 2004). Important subjective belief structures determine the strategy for improving individual or group status. These are permeability, stability, and legitimacy (Haslam, 2004; Hogg, 2012; Tajfel & Turner, 2004). The permeability of a group is concerned with perceptions of whether or not there is a possibility to move into the higher-status group. The stability of a group's status can either be more dynamic or much more stable. Lastly, the legitimacy of a group's status relations concerns the moral aspects underpinning the motivation for changing their social status. This differs from permeability and stability, which are focused on whether there is an opportunity to change.

As previously mentioned, individuals strive to achieve positive self-esteem through membership of an ingroup (Tajfel & Turner, 2004). When social comparisons take place, an ingroup can be perceived to be high- or low-status (Tajfel & Turner, 2004). This evaluation determines whether the group attempts to improve or maintain their current social status by adopting one of three strategies for self-enhancement, which in this context refers to the collective self (Hogg et al., 2004; Tajfel & Turner, 2004): individual mobility, social creativity, or social competition. The adopted strategy is highly dependent on beliefs regarding the permeability of group boundaries, and the stability and legitimacy of status relations (Ellemers & Haslam, 2012; Hogg et al., 2004).

First, individual mobility beliefs are based on the assumption that group boundaries are permeable and, thus, the possibility exists for an individual to freely move between groups to improve their social status (Ellemers & Haslam, 2012; Haslam et al., 2004; Rees et al., 2015). Additionally, the strategy of individual mobility is focused on improving the social status of the individual rather than the ingroup as a whole and distancing themselves from being seen as a member of the low-status group. Importantly, this emphasises how the individual self differs from other group members. Yet, this strategy is argued to have limited success because it is not in the best interests of the superior group to allow individuals to easily move to the higher status group. This is because large movements of people would eventually lead to the comparison group disappearing and remove the reason for its superiority in the first place (Hogg et al., 2004).

When group boundaries are perceived as impermeable, group members must rely on collective action through social creativity or competition to maintain or improve their group's social

status. Additionally, under conditions where an ingroup's status is perceived as stable and legitimate (i.e., secure), social creativity becomes the most likely strategy for self-enhancement (Haslam et al., 2004; Rees et al., 2015; Tajfel & Turner, 2004). Ingroup members will attempt to change the attributes used for social comparison or find an entirely new comparative outgroup. Importantly, this strategy is only likely to help group members accept their current low standing but should assist in boosting self-esteem. However, it does nothing to change the current social status of the group. Social competition involves direct action by ingroup members to challenge their current social status. It is most likely to occur when the status of an outgroup is perceived to be unstable, or the ingroup's low status is considered illegitimate (Haslam et al., 2004; Rees et al., 2015; Tajfel & Turner, 2004). In contrast to individual mobility and social creativity, social competition attempts to bring about material and tangible change for the entire ingroup.

Under conditions where the ingroup is perceived to hold a higher status than the comparison outgroup, the primary aim is to maintain their group's superiority. This is achieved by adopting the same strategies, which are dependent on the same perceptions of permeability and security of status (Haslam et al., 2004; Tajfel & Turner, 2004). For instance, when the group boundaries are perceived as impermeable, and the group status is secure, the ingroup might present as magnanimous by showing support towards the outgroup on seemingly irrelevant characteristics.

In this section, the main assumptions of SIT have been presented and describe the underlying processes involved in an individual pursuit of achieving positive self-esteem. Whether this is achieved as a member of or separate from an ingroup is entirely dependent on the interplay between psychological and social factors perceived by the individual. The second subtheory of the SIA is discussed in the next section. SCT was primarily developed to overcome the limitations of the SIT in explaining, for instance, the social context that makes a particular social identity salient over another. This is broadly achieved by focusing on the underlying cognitive processes.

3.3.2 Self-Categorisation Theory

The development of SCT was in response to limitations in SIT (Haslam, Boen, & Fransen, 2020). SIT is argued to contain no explanation of when individuals are most likely to define themselves in relation to a given social identity nor the consequences of defining the sense of self in group terms (Haslam, Boen, Fransen, & Reicher, 2020; Turner et al., 1994). In an experiment known as the minimal group studies, participants were assigned to groups based on arbitrary criteria, which was sufficient to make a social identity salient and foster ingroup favouritism (Billig

& Tajfel, 1973). Groups were then asked to compete against each other. After the study, when participants found themselves in different social contexts, their sense of self would likely be defined by more salient social identities, such as being a member of a particular dorm at the campsite. Additionally, SCT extends SIT by explaining how group behaviour is made possible through social identification (Rees et al., 2015). Moreover, the theory specifies more fully the conditions that determine a particular social identity being more salient and the consequences of this occurring (Haslam, Boen, Fransen, & Reicher, 2020). This is because the core assumptions of SCT do not specifically deal with social structures and intergroup relations in the way that SIT does (Haslam, 2004).

Within SCT the self-concept was introduced to better explain an individual's behaviour as being determined by interpersonal and intergroup social interactions. Thus, when personal identity is made salient, it is associated with interpersonal behaviour, while social identity pertains to intergroup behaviour (Turner, 1982; Turner et al., 1994). Crucially, the psychological process of making a particular social identity salient, known as depersonalisation, is argued to make group behaviour happen (Turner, 1982). Moreover, depersonalisation involves a process of self-stereotyping where individuals increasingly view themselves as interchangeable representatives of the ingroup rather than as distinct entities characterised by their differences from others (Hogg, 2012; Stevens et al., 2017; Turner et al., 1994). Thus, in intergroup contexts, individuals tend to perceive outgroup members as similar or homogeneous and ingroup members as separately homogeneous (Turner et al., 1994). Importantly, when the self is defined stereotypically in terms of a set of shared characteristics, with ingroup members considered representatives of the same social category, this is called self-categorisation. This change in self-structure helps govern group behaviour informed by a set of needs, goals and norms shared with others perceived to be representatives of the same social category (Rees et al., 2015; Turner et al., 1994).

Importantly, self-categories exist at varying levels of abstraction. At higher levels of abstraction, social categories are broader in scope and include a wider range of individuals, while at lower levels of abstraction, social categories are more restrictive and, consequently, emphasise differences between individuals (Hogg & Turner, 1987). The self-concept can reflect three levels of abstraction: human, social, and personal (Turner et al., 1987). Within social situations, an individual will have more than one level of self-category available. The greater salience of one level of social self-category leads to other self-categories becoming less salient. Thus, an individual who

plays for a football team may define themselves in terms of social self-categories varying from the more to less abstract - as an athlete, footballer, or centre forward. Importantly, each level of abstraction has the ability to contribute towards an individual's self-concept, with no level being viewed as more useful or appropriate in this process.

The formation and salience of self-categories are seen as a function of the meta-contrast, a concept that helps shape how we see ourselves and our place in different social groups. This principle refers to the process individuals use to define and categorise themselves within social groups based on the degree of similarity and difference between their own salient attributes and those of other group members (Turner et al., 1987). Thus, people are more likely to categorise themselves as members of a particular group when the differences between their own attributes and those of other group members are smaller than the perceived differences between members from a relevant outgroup. Moreover, social category salience for a given level of abstraction leads to the accentuation of perceived ingroup similarities and outgroup differences as prescribed by category membership at the same level (Turner et al., 1987). The process provides on-the-fly information regarding the relative differences meaning that the same category can vary due to a shift in the social context.

The meta-contrast principle is also important in determining the internal structure of social categories insofar as there will be category characteristics that are represented better than others. Thus, individual ingroup members will be perceived to vary in terms of how representative or prototypical they are of the ingroup's defining characteristics (Turner et al., 1987). This means that an individual's level of prototypicality will increase depending on the differences between ingroup members being perceived as smaller than the difference between them and members of a particular outgroup. Furthermore, depersonalisation shifts an individual's view of themselves as a representative of the ingroup and no longer as a unique individual (Hogg, 2012).

For example, in contrast to a sports person who is a long-distance runner, the snooker player, who is involved in a non-endurance sport, may be quite prototypical of the category 'snooker player' because that person partly embodies the differences between snooker player and long-distance runner. However, when the social context changes and the comparison is made to a stockbroker, that person's prototypicality will decrease relative to someone who is more 'sporty' and similar to the long-distance runner. Thus, prototypicality varies as a function of the social context where categorisation occurs.

Within SCT, the conditions that dictate the social category most likely to be made salient in a given context are determined by readiness and fit. The readiness of an individual to perceive and categorise themselves within a specific social category interacts with the fit of social category salience (Turner et al., 1987). An individual's readiness is influenced by various factors, including past experiences, cultural norms, and group values, with greater readiness leading to greater salience (Haslam et al., 2004). For example, if a person strongly identifies with a particular group, they may be more inclined to interpret the world and their place in it in a manner consistent with that group's values and culture (Stevens et al., 2017).

Available social categories then act to inform an individual about their present social context (Hogg et al., 2004). Where the difference in social category is perceived to be inconsistent and contradictory with the individual's expectations about a group, social categorisation will not occur. This is a reflection of the overall fit of a social category being poor, and when this occurs, the process will continue until a more optimal fit is achieved (Hogg, 2012; Hogg et al., 2004). For example, a professional footballer who joins a new team known for their tactical style but, after a change in manager, switches to an open and free-flowing style is likely to cause poor category fit, and a search for a more optimally fitting social category would ensue.

3.3.3 Measuring Social Identification

Research that has examined the process of social identification has often treated it as though a unitary construct (e.g., Stevens et al., 2019). Some have raised concerns that this does not adequately measure the construct (e.g., Ashmore et al., 2004; Leach et al., 2008), but more recent findings suggest that a single-item approach can be just as effective at measuring social identification (Reysen et al., 2013). Yet, the broader aims of this thesis were to examine the possible theoretical links between the SIA and SDT frameworks. Thus, this thesis adopted a multi-faceted approach to measuring social identification. This approach would likely offer greater opportunities for examining theoretical links between the two frameworks.

The Multi-Component Ingroup Identification Scale (MIIS; Leach et al., 2008) is a hierarchical model that contains five factors that each describe a particular aspect of the social identification process. These are arranged in two general factors self-definition (i.e., self-stereotyping and ingroup homogeneity) and self-investment (i.e., centrality, satisfaction, and solidarity). The latter was selected for the thesis based on findings that have shown it most relevant when conducting research involving comparisons between competing groups (Leach et al., 2008).

More broadly, the general self-investment factor is characterised by: an individual's identification with an ingroup and the positive feelings associated with that particular group membership (i.e., satisfaction); the level of importance a group membership has to an individual's self-concept (i.e., centrality); and the level of commitment an individual has to their group membership (i.e., solidarity; Howard & Magee, 2013; Leach et al., 2008; Lovakov et al., 2015). It has been argued that the degree of social identification increases in response to the satisfaction and solidarity experienced by individual group members (Leach et al., 2008; Tajfel, 1978). Thus, examining this specific aspect of the social identification process necessitated a multifaceted conceptual approach.

In summary, the exploration of the SIA within this section demonstrates the important contribution that the framework has provided in describing key group processes that span group formation and intergroup behaviour (e.g., Tajfel & Turner, 1979; Turner et al., 1987). Furthermore, the SIA describes the multifaceted levels of human interaction from the personal to the broadly cultural. The profound impact of self-categorisation on shaping social realities and relationships has emerged as a critical component in explaining what determines intergroup behaviour. Overall, this theoretical overview lays the foundation for the remainder of this chapter and the thesis, supported by the empirical findings presented in Chapter 2. For this thesis, it will be important to identify the core assumptions relevant to examining the relationship between the SIA and SDT frameworks. Thus, in the next section, the focus shifts to how the SIA and SDT frameworks will be used to inform the general aims of this thesis and the adopted unified approach.

3.4 The Challenge in Bridging the Theoretical Divide

This section outlines several challenges of applying a unified approach to investigating motivation and group processes underpinned by the SIA and SDT frameworks. Initially, the discussion considers the broad limitations inherent to each framework alongside a discussion on potential mitigation strategies, leveraging the respective strengths of each framework, and how they will inform the wider aims of the thesis.

3.4.1 The Role of Social Context

Proponents of SIA argue that SDT is an individualistic approach that runs counter to the SIA framework (Platow & Grace, 2020). However, this claim is contested by supporters of SDT that argue the core of the framework is concerned with social features (Chirkov et al., 2003; Martela et al., 2021) and, thus, not incompatible. As previously discussed, the BPN have been used

in conjunction with social identification within the unified literature with some success (e.g., Greenaway, Cruwys, et al., 2015).

BPN are argued to be influenced by social environments that either support or undermine their satisfaction. Yet, in the case of relatedness, the literature has failed to account for larger social groups, those which individuals are most likely to come into contact with daily. It has been suggested that SIA can enhance the concept of relatedness by explaining the processes involved in extending this basic psychological need to larger social groups, especially to practical, real-world scenarios (Martela et al., 2021). Logically, the concept of relatedness closely aligns with the SIA framework, as both concentrate on social interactions, though they operate at varying levels of interaction. That is, relatedness might offer a unique insight into inter-individual harmony within a group (Reinboth & Duda, 2006), which differs from the focus of intergroup processes that underpin the SIA. Moreover, this assessment of interpersonal harmony within a group might also provide an indication of the type of strategy a group member might employ to maintain or, more likely scenario, improve their social status (e.g., Tajfel & Turner, 2004). Thus, the possibility of linking the two frameworks between relatedness and social identification will be an important line of inquiry to investigate as part of this thesis.

3.4.2 Personal and Social Identities

The debate around the prominence of personal and social identities is closely related to the previous point. Proponents of the SIA have argued that the purely interpersonal social interaction is unlikely to exist (e.g., Haslam, 2004; Tajfel, 1974). The primary reason for this notion is that social categories are always likely to influence social interactions in some small way. Yet, the literature on the interpersonal relationships important role within the lives of individuals is extensive (Bartholomew et al., 2011; Baumeister & Leary, 1995; Baumeister et al., 2016; Shannon et al., 2021). Thus, the evidence would suggest that there is some degree of compromise between the extremes of interpersonal and intergroup. Importantly, proponents of the SDT have stressed that the framework has always been concerned with issues that extend beyond the mere interpersonal and outlined the importance placed on individual interaction between the self and the social environment (e.g., Deci & Ryan, 2012; Deci et al., 2017; Martela et al., 2021). Thus, while some might see the two frameworks being in conflict there appears to be far less distance between them on the issue of the social environment.

3.4.3 The Self

Another contentious issue concerns how the self has been conceptualised within each framework and how identities are positioned within the self. While both approaches agree on the existence of multiple identities, within the SIA framework, an individual can hold multiple social identities only restricted by the richness of their social environment. In contrast, within the SDT framework, the discussion has been focused on the degree that the multiple identities are integrated and experienced as part of an authentic self (Ryan & Deci, 2012). Yet, as was the case with the debate regarding social environments, the two theories do not appear to be poles apart, as some might argue. Indeed, much of the discussion on multiple selves put forward by Ryan and Deci (2012) can be aligned with various concepts and processes contained with the SIA framework. For instance, both frameworks outline the variability that exists in terms of the degree to which an individual is representative of a particular social identity, referred to as prototypicality within the SIA framework. Thus, there does appear to be a great deal of overlap, with the primary issue being the existence and role of an authentic self.

3.4.4 Motivation

The brief discussion on the degree of social interactions and conceptualising of multiple identities has served to highlight these two critical debates. However, these points are not within the scope of this thesis and, as such, will not be discussed any further. The decision was made because the primary focus of the thesis was on understanding more broadly the interaction between motivation and group processes rather than contributing in a substantive way to the debate regarding these two issues.

Ryan and Deci (2017b) have highlighted that motivation can often be reduced to a unitary and global measure where the amount of motivation is preferred over and above the quality. This approach negates the variety of different phenomenological features of motivation that SDT sets out. Clearly, SDT is the more refined and developed explanation of human motivation. A major contribution of SDT is the framework's ability to differentiate between multiple forms of motivation that regulate behaviour in such a way as to say something about the quality and quantity of the experience.

When the concept of motivation is directly referenced in the SIA literature, it can often lack a clear definition grounded in evidence, in contrast to the SDT literature. The SIA literature tends not to fully define the meaning of motivation or makes the assumption that the concept has a

generally accepted and agreed definition (e.g., Haslam, Reutas, et al., 2023; Haslam et al., 2004; Mertens et al., 2020). In other instances, performance is taken as a proxy for motivation that underpins behaviour (Van Knippenberg, 2000). The importance placed on the self-categorisation process in dictating group-defined motivation could partially explain this definitional issue.

For instance, it has been argued that individuality is given preferential status within theories of motivation, such as SDT (Haslam et al., 2000). Because of this, individuals are motivated to satisfy personal needs, whilst, as group members, motivation shifts to satisfying social needs that foster social identification. Thus, the SIA framework is argued to be different from, for example, SDT, because it focuses on the salience of any given category of needs governed by self-categorisation. Thus, under conditions of shared social identity, individuals are motivated to identify and conform to shared group norms, which also infers that what is salient can change in relation to the social context.

Arguably, the motivational aspects of SIA remain an area that requires further development (Abrams & Hogg, 2004). A core reason for this is related to the suggestion that an individual's motivation for seeking out groups can be for a multitude of reasons, for example, safety concerns, completing a task that would otherwise be impossible without being a member of a group, and the need to reduce uncertainty about oneself and one's place in the world (Choi & Hogg, 2020).

Self-enhancement and positive self-esteem have provided the most significant developments in understanding motivation in terms of SIA (Hogg, 2000, 2001). However, supporting evidence for the role of personal self-esteem as a determinant of intergroup behaviour as hypothesised by SIT has been limited (Jetten et al., 2015). Thus, more recent work has examined personal self-esteem as an outcome of group membership rather than being a primary reason for individuals to seek out groups. Furthermore, the focus on personal self-esteem, a measure of individual difference, is indicative of proponents of the SIA showing interest in understanding how group membership directly affects the experience of the individuals rather than being solely concerned with collective outcomes.

SDT has made a significant contribution towards our understanding of the influence of rewards on experiences of intrinsic motivation (e.g., Deci et al., 1999). These are set out within the subtheory of cognitive evaluation theory. Rewards would constitute a need within the context of the SIA framework. Thus, the motivational effects of self-category salience need to be considered. As a group member, a reward would only be motivational insomuch as it conferred with that

group's shared norms and goals. SDT has been able to explain the role of rewards because the framework sets out the qualitatively different motivational types, with which the effects of rewards can be compared.

The concept of motivation will have an integral role in providing a much richer and complete picture of the qualitative features that underpin an individual's experience of seeking out group memberships. Moreover, understanding the role of group membership on individual motivation for engaging in a particular group behaviour would seem appropriate in the context of SIA literature also focusing on individual outcomes such as personal self-esteem. Furthermore, findings on marginal and prototypical group members have shown that individual group members exhibit varying degrees of effort depending on whether they are more or less prototypical (Okimoto & Wrzesniewski, 2012). Thus, this thesis aims to examine individual group members underlying motivation in relation to levels of social identification.

3.4.5 The Motivational Continuum

The empirical evidence from the unified literature presented in Chapter 1 also demonstrated the variety of ways SDT has been used to extend the SIA. More specifically, the motivational continuum has been successfully applied to understanding the underlying motivation for engaging in a behaviour (e.g., Neys et al., 2014; Schertzinger, 2023) and motivation to identify (e.g., Amiot & Sansfacon, 2011; Amiot et al., 2013). This feature will be specifically examined across the studies of this thesis. The motivational continuum offers the ability to examine both the global level of motivation experienced by the individual group member and the qualitative features of the motivation. The relationship between BPN and social identification will be examined across multiple social contexts. Moreover, as suggested in this chapter, a particular focus will be placed on understanding whether relatedness has some special role when examined alongside core social identity concepts, such as social identification. given to the concept of relatedness.

3.4.6 Group and Individual-level Analysis

SDT primarily deals with processes at the individual-level of analysis, although any suggestion that this is merely an individualistic theory has been contested (Deci & Ryan, 1985b; Martela et al., 2021). Whilst it does directly deal with group-level issues through the influence of wider norms and values of social groups on the internalisation of behavioural regulations, this could be argued to be a somewhat unidirectional process. However, the basic psychological need for relatedness does argue for a level of reciprocity with an individual's social environment and

significant others who might provide support (Deci & Ryan, 2002; Schuler et al., 2014). The framework focuses primarily on explaining interpersonal social interactions, highlighting the social environment's importance in facilitating or undermining intrinsic motivation.

The SIA offers a theoretical framework couched in describing social phenomena by analysing group-level factors and differs markedly from SDT. More specifically, criticism has been levelled at attempts to explain group behaviours simply by attending to the individual, their personalities, or their interactions with each other (Hogg, 2008). Such approaches are considered inadequate for capturing the full range of processes that govern social phenomena and groups. Whilst individual and interpersonal analysis might be sufficient in understanding small groups, such explanations are considered absurd when examining group processes in large groups such as organisations (Hogg, 2008), a point that has somewhat been supported by SDT proponents (Martela et al., 2021).

SDT would be considered reductionist in how social groups are formalised within the framework because it only accounts for the influence of social groups through the internalisation process. The theory cannot explain how the individual might affect other group members or, more importantly, their role in affecting intergroup processes. Thus, the strength of SIA in explaining social phenomena and groups can be extended to SDT, such as through complementing the role of relatedness in larger groups (e.g., Drury et al., 2009; Novelli et al., 2013).

SDT formally outlines the role of rewards within its cognitive evaluation theory, but what is missing within this explanation is how intergroup processes, such as social competition, might directly relate to the type of rewards available or the influence on other aspects of the framework. Within the SIA framework, social competition is explicitly dealt with as part of the identity management strategies that individual group members engage in dependent on a range of factors such as the status of one's group, social context, and fit of a particular social category. This process is undergone to help improve or maintain a group's current social status. Where SIA can differentiate the type of intergroup behaviour, it offers opportunities to explore how the forms of motivation and BPN might be affected by whether interpersonal or intergroup behaviours are made salient.

Thus, many of the core SIA concepts will be explicitly or implicitly tapped into across the thesis studies. Social identification, which will act as the main measure from the framework, will be directly examined through an individual's strength of identification with their ingroup and

assignment to a particular experimental group. Intergroup processes have important facets that can be tapped into or considered implicit in the social situation. For instance, how SDT concepts are influenced by identity management strategies will be possible through explicit manipulation to create social competition but also implicitly through examining groups where social competition is inherent to their social environment (e.g., sports teams). Furthermore, where identity strategy management might be expected to occur, these situations will be underpinned by processes such as self-enhancement and readiness and fit to maintain or improve the ingroup's current status.

3.4.7 Summary

In this chapter, the core theoretical assumptions of SIA and SDT that are relevant to the aims of this thesis were reviewed. The main strengths and limitations were then discussed, highlighting the ways in which each framework can be used in a unified approach to mitigate or extend each framework. In the case of SDT, its explanation of social environments has either been limited by evidence on close relationships, as was the case for relatedness, or lacks an explanation of intergroup processes in settings where competition is likely. These are key areas where the SIA can substantially contribute to the SDT framework. Conversely, the SIA has tended to focus on a range of needs likely to motivate an individual to seek out group membership. Yet, in most cases, the method for assessing motivation lacks specificity and consistency across the SIA literature. Thus, as shown by the unified approach literature in Chapter 2, there are tangible benefits to be gained by bringing these frameworks into closer alignment. A point that might be contested, to a greater or lesser degree, by SIA proponents and gaining support from those on the side of SDT.

The next chapter is the first of three chapters that present empirical research adopting a unified approach to SIA and SDT. Study 1 explores the relationship between BPN satisfaction and frustration, and social identification for employees of organisations and embedded within workplace teams. Broadly, the study has two primary aims. First, to investigate whether the basic psychological need for relatedness is more closely aligned with the underlying components of social identification than autonomy and competence. Second, to determine whether the use of latent profile analysis offers a useful approach to identifying hidden subgroups that exist in an otherwise heterogeneous population. Successfully, attending to each aim will provide a springboard to the remaining studies of this thesis.

4 SOCIAL IDENTITY AND SELF-DETERMINATION IN THE WORKPLACE

4.1 Introduction

The previous chapters set out the empirical evidence and the theoretical assumptions that underpin the support for adopting a unified approach that brings the social identity approach (SIA) and self-determination theory (SDT) into closer alignment (e.g., Neys et al., 2014). Broadly, the literature review (Chapter 2) demonstrated the links between basic psychological needs (BPN) satisfaction, self-determined motivation, or strongly identifying with a particular group, leading to many positive outcomes. This evidence was further supplemented by research that adopted a unified approach, extending previous findings in SDT and SIA literature. The theoretical framework discussion (Chapter 3) provided further context by identifying the main strengths and limitations of SDT and the SIA. More importantly, the chapter highlighted how each framework could be unified to extend and strengthen them. For instance, while SDT has typically focused on close relationships, SIA offers a more complete explanation of intergroup processes that extend to large groups.

The empirical study presented in this chapter examines employees' experiences working within organisations as the basis for building on previous work, bringing together BPN and social identities in a unified approach (e.g., Greenaway et al., 2017). In addition, this study aimed to contribute to the broader aims of the thesis by developing theoretical links between the frameworks and examining the impact that the frameworks have on well-being within a performance-type setting. This chapter specifically examined the relationship between BPN and social identification and how these concepts influenced employee well-being.

4.1.1 Well-being as an Outcome

Well-being in the workplace plays a significant role in affecting the employee's performance and, subsequently, the organisation more widely. This is because stress can lead to reduced functioning and absenteeism (Olafsen et al., 2017; Schultz et al., 2015; Steffens et al., 2017). Conversely, when employees experience improved well-being, this can help to enhance the quality of life and work satisfaction of employees (DeJoy & Wilson, 2003; Wright & Jackson, 2007) while also promoting organisational health (Schultz et al., 2015).

There is a paucity of empirical evidence that has directly examined the proposed unified approach encompassing BPN and social identity processes. However, several studies have

successfully adopted this approach (Amiot et al., 2010; Bettencourt & Sheldon, 2001; Chatzisarantis et al., 2009; Greenaway, Cruwys, et al., 2015; Greenaway et al., 2017; Sheldon & Bettencourt, 2002). Each of these studies has contributed unique insights into the relationship between BPN and social identity processes by describing the mechanisms that underpin improvements in health.

Generally, findings have shown that satisfaction of the three BPN and greater social identification has led to improvements in self-reported health (Amiot et al., 2010; Bettencourt & Sheldon, 2001; Chatzisarantis et al., 2009; Greenaway, Cruwys, et al., 2015; Greenaway et al., 2017; Sheldon & Bettencourt, 2002). However, the pathway through which health was predicted was found to be mediated by social identification (Amiot et al., 2010; Greenaway et al., 2017) or satisfaction of BPN (Greenaway, Cruwys, et al., 2015). Alternatively, each of the BPN has been shown to be equally important, acting independently, to predict improvements in health (e.g., Greenaway, Cruwys, et al., 2015), which is argued to demonstrate that autonomy, competence, and relatedness are indeed 'basic needs' (Van den Broeck et al., 2016).

Each of these studies has helped to progress the unified approach in important ways, offering unique insights that would not have been possible by only attending to principles of SDT or the SIA alone. First, it was shown that group membership can lead to the satisfaction of BPN, which subsequently enhances personal well-being (Bettencourt & Sheldon, 2001; Sheldon & Bettencourt, 2002). For instance, competence was found to be derived from participants being able to experience their social roles as autonomous and affording feelings of relatedness (Bettencourt & Sheldon, 2001). Second, individual and group-level factors were important in understanding social identity processes in the context of group integration (Amiot et al., 2010; Sheldon & Bettencourt, 2002). For instance, individual-level coping strategies were found to be significant mediators only in the absence of group-level coping strategies (Amiot et al., 2010). Third, the type of group, whether formal (e.g., groups with charters) or informal (e.g., groups based on friendship), has important implications for the experience of BPN and social identity processes (Sheldon & Bettencourt, 2002). For instance, differences in outcomes, such as positive affect, were similar across groups. What distinguished the two types of groups were the experiences of autonomy, personal distinctiveness, and group distinctiveness.

Thus, while differences exist in the overall findings from each of these studies, taken together they offer a significant contribution in forwarding a unified explanation of individual and group-level processes. Moreover, BPN and social identification are important factors in explaining

the mechanisms that enhance and protect personal well-being in the context of group membership.

The empirical evidence in each of the respective fields of SDT and the SIA in the context of health outcomes are substantially larger than that for the unified literature. The main finding from the unified literature can be seen to be partially supported by the corresponding fields' evidence base. Broadly, findings from the BPN literature have indicated that satisfaction of the three BPN has been found to facilitate improved well-being (e.g., Edmunds et al., 2007; Ntoumanis et al., 2021). More specifically, in the context of the workplace, improvements in reported health have been associated with greater workgroup identification (Dunstone et al., 2023; Haslam et al., 2009; Klik et al., 2023; Knight & Haslam, 2010; Schumacher Dimech & Seiler, 2011) or satisfaction of BPN (e.g., Deci et al., 2001; Van den Broeck et al., 2016). Conversely, the literature on BPN has further shown that need frustration has been positively associated with an increase in ill-being (e.g., Chen et al., 2015; Gillet, Fouquereau, et al., 2012; Van den Broeck et al., 2008). Similarly, decreased workgroup identification has been associated with adverse health outcomes such as burnout and perceived stress (Haslam & Ellemers, 2005; Haslam et al., 2009; Peters et al., 2010; Wegge et al., 2006).

The literature on SDT has often placed BPN satisfaction as a mediator through which a range of outcomes are predicted, including facilitating self-determined motivation (e.g., Adie et al., 2012; González et al., 2016; Quested et al., 2013) or improved well-being (e.g., Ryan et al., 2010; Šakan et al., 2020; Vander Elst et al., 2012; Vermote et al., 2022). Yet, across the range of studies, including those adopting a unified approach, there has been inconsistency in either the measurement or modelling of BPN as either a unitary construct (i.e., psychological need satisfaction) or as separate constructs (Quested et al., 2013).

4.1.2 Importance of Each Basic Psychological Needs

The ability to differentiate between each BPN has great importance to allow the unique contribution of each BPN to be observed in mediating relationships or predicting particular outcomes (Chen et al., 2015; Deci et al., 2017; Quested et al., 2013; Van den Broeck et al., 2016). Similarly, it has been argued that need frustration should be included alongside need satisfaction because past research has shown that need satisfaction was less effective in predicting negative outcomes (Chen et al., 2015; Deci et al., 2017; Reed-Fitzke & Lucier-Greer, 2021; Van den Broeck et al., 2016). An explanation for this finding is reflected in the statement that "the absence of a positive does not imply a negative and the absence of a negative does not imply a positive"

(Van den Broeck et al., 2016, p. 1221).

This raises two critical points. First, an averaged global score for BPN prevents an examination of a main tenet of SDT regarding the interdependence between each of the BPN (Curran et al., 2016; Ryan & Deci, 2017a), while also ignoring previous findings that demonstrate the independent effects of the individual BPN (e.g., Greenaway, Cruwys, et al., 2015; Van den Broeck et al., 2016). Second, BPN frustration is not merely the opposite end of a continuum but occurs independently of BPN satisfaction (Olafsen et al., 2018). Thus, when negative outcomes are being examined, they are likely to be better explained by measures of need frustration than need satisfaction.

4.1.3 Basic Psychological Needs from a Person-Centred Perspective

Several studies have employed latent profile analysis (LPA) to explore the relationship between BPN and health in the workplace (Chevrier & Lannegrand, 2022; Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2022; Rouse et al., 2020; Santana-Monagas & Núñez, 2022). The number of profiles observed in each of the studies was four to five, and whilst the shape and interpretation of these profiles differ between studies, there were some striking similarities in the results. First, there was support for the asymmetry of BPN satisfaction and BPN frustration, in that above-average scores in one typically led to below-average scores in the other (Rouse et al., 2020; Santana-Monagas & Núñez, 2022). Yet, the findings go much further in demonstrating the existence of subgroups where BPN satisfaction and frustration profiles have symmetry, whereby above-average scores are observed across both sets of BPN (Santana-Monagas & Núñez, 2022). These two different scenarios can provide useful insights into understanding the interplay between need satisfaction and need frustration in the context of either positive or negative events (Deci et al., 2017; Van den Broeck et al., 2016). Additionally, there is also evidence of asymmetry in the satisfaction of particular needs, for example, below average scores in autonomy satisfaction with above average scores in competence and relatedness satisfaction (Chevrier & Lannegrand, 2022; Rouse et al., 2020; Santana-Monagas & Núñez, 2022). This might be closely related to the previous suggestion that competence can be found to predict outcomes in the opposite direction (Van den Broeck et al., 2016). Thus, using LPA provides a unique perspective on how need satisfaction and frustration are experienced within a population. These findings also provide additional support to the rationale for attending to both satisfaction and frustration separately when exploring BPN (Van den Broeck et al., 2016).

4.1.4 Social Identification in the Workplace

SIA research has shown that workgroup identification is linked to improvements in employee health through positive changes in well-being and reductions in stress levels in the workplace (Steffens et al., 2017). Yet, beyond this direct effect, there is some evidence that the relationship between social identification, well-being, and stress is mediated by receiving social support and the way an organisation responds to workplace stressors (Cocking, 2013; Cocking & Drury, 2004; Drury & Reicher, 2005; Veenstra & Haslam, 2000). Together employees are better able to tackle workplace stressors by drawing on collective resources, such as support from colleagues, rather than adopting individual strategies, such as avoidance, that only worsen the situation (Haslam & Reicher, 2006).

Additionally, it has been suggested that situations can arise where strong workgroup identification could have negative effects on well-being as seen in other domains like discrimination and mental health (Cruwys et al., 2014; Jetten et al., 2001). For example, a negative association between workgroup identification and health could arise when employees experience a negative work environment (Steffens et al., 2017). Furthermore, strong workgroup identification can sometimes lead to less cooperative behaviour among individuals if they feel that the organisational image conflicts with their professional identity (Dukerich et al., 2002). In these circumstances, group members might choose social mobility to improve their situation where group boundaries are perceived to be permeable or social competition where group boundaries are viewed as impermeable (Terry, 2002; Terry & Hogg, 1996; Terry et al., 2001).

Another important aspect of workgroup identification is the extent to which a workgroup shares the same social identity. It is not enough for an employee to experience a high degree of workgroup identification for improvements to be observed in employee health, but rather, it is the extent to which employees share in the same social identity that is important (Steffens et al., 2017). This is because a shared social identity forms the basis for social support and coping with workplace stressors. When a social identity is shared between group members, this is likely to promote a greater willingness to help and support a fellow group member (Haslam, 2004; Haslam et al., 2005). This has been demonstrated in studies that have found that individuals are more likely to help a stranger when that person is seen to share a social identity (Drury et al., 2009; Foddy et al., 2009; Hopkins et al., 2007; Levine et al., 2005). Furthermore, evidence has shown that social support that stems from a shared social identity can minimise the adverse effects of stress

(Branscombe et al., 1999; Terry et al., 2001).

4.1.5 Social Identification from a Person-Centred Perspective

Person-centred analysis using LPA has also been employed in SIA research and provides a similarly broad range of findings as seen in the SDT literature. There are also some similarities across this collection of studies that provide unique insights into how social identity operates within a larger heterogeneous population. A study examined the effects of multiple identity integration within the context of an organisation and its effect on health (Manzi et al., 2023). The findings showed that greater identity integration of gender and organisational identities led to the highest reported well-being. In contrast, the subgroup with the lowest levels of gender and workgroup identification and identity integration also reported the lowest well-being. Notably, where either gender or workgroup identity was high, but identity integration was low, the subgroups reported well-being was significantly lower than the subgroup with high identity integration scores.

Similar findings were found where greater identification was associated with better health outcomes (Jackman et al., 2023; Zhao et al., 2022). In addition, when examining the experiences of post-doctoral students role in terms of workgroup identification and social support, it was found that along with greater identification, high support also promoted higher levels of well-being and reduced distress. Conversely, the subgroup with the lowest reported support and workgroup identification was associated with significantly worse outcomes across reported well-being and psychological distress.

Another study examined employees' commitment to their organisation, workgroup, customers, relations to their supervisor and colleagues, and intentions to quit (Morin et al., 2011). The different profiles that were found reflected similar findings from the previous LPA studies. The subgroup with the highest level of commitment, akin to workgroup identification, across each measure, was found to have the highest job satisfaction. The subgroup with the weakest commitment levels across each variable had the highest reported intentions to quit. Notably, a subgroup was found that contained individuals who were primarily focused on their careers and lacked commitment in all the other areas. This is perhaps reflective of individuals focused on individual mobility.

4.1.6 Summary and Rationale

The empirical evidence presented in this section demonstrates the considerable knowledge surrounding the application of SDT and the SIA to the realm of employee health. Yet, this section

has also demonstrated the nuanced ways in which SDT and the SIA tap into very different facets of an employee's work environment.

First, satisfaction and frustration were found to be equally important, with satisfaction better predicting positive outcomes and frustration negative ones. Second, the unified literature has demonstrated a relationship between BPN and social identification. Third, the type of group an individual is a part of is likely to influence individual and group-level factors. Fourth, findings from the separate fields of BPN and SIA would suggest that there was likely to be a relationship between social identification and well-being that is mediated by BPN. Fifth, based on findings from the LPA literature, it would seem plausible that profiles would exist that contain asymmetrical values (e.g., high need satisfaction, low need frustration).

In Phase 1, the analysis examines the structural relationship between social identity processes and BPN. In Phase 2, the analysis employs LPA to identify latent profiles that describe the differences in group identification, BPN, and perceived stress. In both phases, data from the same population are used to conduct the analysis. The research hypotheses for Phase 1 are:

- H1: BPN mediate the relationship between workgroup identification (indirectly or directly) and perceived stress (i.e., higher need satisfaction and lower need frustration leads to higher identification, which leads to lower perceived stress).
- H2: Self-investment mediates the relationship between need satisfaction or frustration (directly or indirectly) and perceived stress (i.e., higher workgroup identification leads to higher need satisfaction and lower need frustration, which leads to lower perceived stress).
- H3: The BPN for relatedness is highly correlated with workgroup identification (i.e., satisfaction of relatedness is positively associated and frustration is negatively associated with workgroup identification).
- H0: There is no association between the three main factors of workgroup identification, BPN, and perceived stress.

The research questions for Phase 2 are:

- H4: Do workgroup identification, BPN, and perceived stress exhibit interrelationships?
- H5: What are the underlying profiles for workgroup employees with 10 or more colleagues?

4.2 Method

4.2.1 Participants

Participants ($N = 305$) were recruited from the crowdsourcing platform Prolific (Palan & Schitter, 2018), which provides access to a pool of research participants for online surveys and experiments. Crowdsourcing participants in this way has steadily grown in popularity in the field of social sciences (Hauser et al., 2019). This is understandable given the availability of a dedicated pool of subjects, population pre-screening, and ability to conduct different types of experiments (e.g., longitudinal, surveys, experiments; Palan & Schitter, 2018). Crowdsourcing platforms are also simple to use and offer the ability to recruit from a diverse pool of participants quickly and at a relatively low cost to the researcher (Hauser et al., 2019).

Some have raised concerns regarding the rise in the use of crowdsourcing platforms for collecting study data and possible issues with the quality of collected data (Burnette et al., 2022; Hauser et al., 2019; Mellis & Bickel, 2020). However, a recent study examining the quality of participants' responses across various crowdsourcing platforms found that the Prolific sample had the highest quality data across 10 out of 12 measures (Douglas et al., 2023). Moreover, in the case of attention checks, Prolific participants correctly responded at least 98.3% of the time, a finding supported by previous research (Peer et al., 2022). Pre-screening of participants allows researchers to select a sample that meets the inclusion criteria of their study whilst also limiting participation to those who have completed a certain number of studies successfully. Low-quality responses or incorrect responses to attention checks can lead to rejected submissions, identifying those who might be less reliable participants.

The inclusion criteria set for Phase 1, taking advantage of the pre-screening participant data, were for individuals who reported: 1) being in full-time employment in an office-based role in the UK, 2) working in a team of 10 or more members, 3) the role is primarily face-to-face with colleagues and 4) English as a first language. In terms of recruiting high-quality Prolific participants, only those with 50 or more submissions and two or fewer rejected submissions were allowed access to the study.

A total of 305 individuals ($M_{\text{age}} = 39.9$, $SD = 9.6$) completed the survey and were included in the initial sample. This sample exceeds the general rules on sample size for structural equation modelling (SEM) derived from simulation studies (Kline, 2005; Muthén & Muthén, 2002). Therefore, a sample of 300 was considered acceptable.

The sample comprised 152 males and 146 females, with 7 preferring not to say. The sample compromised individuals who identified as White ($N = 261$), Asian ($N = 17$), Black ($N = 10$), Mixed ($N = 9$), and Other ($N = 8$). The vast majority of individuals reportedly worked for organisations with more than 1000 employees ($N = 170$), while the remainder worked in smaller organisations ($N = 135$).

The survey was estimated to take 5 minutes to complete. Two submissions that were completed in less than 90 seconds were excluded from the study due to the likelihood of these being poor quality respondents. Their data was supplemented by two additional participants from the available pool. In addition, every fourth submission was reviewed manually to check the quality of the submission. For instance, examining for a pattern of responding that did not make logical sense. In addition, a small number of participants ($N = 5$) failed at least one of the two attention checks and were excluded from the analysis. No participants submissions were rejected after this review process based on the inclusion criteria.

4.2.2 Procedure

Ethical approval was obtained from the Staffordshire University Ethics Committee. Participants received information about the study before agreeing to participate with consent provided electronically. Participants who took part were asked to complete a survey containing three validated measures (see Appendix A). Data were collected using the Psytoolkits online platform (Stoet, 2010, 2017). Participants were reimbursed for their time through payment equivalent to £6 per hour prorated for their participation.

4.2.3 Measures

4.2.3.1 Workgroup Identification. The Multi-Component Ingroup Identification Scale (MIIS; Leach et al., 2008) is a two-dimensional model containing factors of self-definition and self-investment, which reflect different aspects of ingroup identification. It is a 14-item measure that uses a Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Findings suggest that homogeneity, as measured by the self-definition factor, which contains four items, can be lacking even when group members report high identification and, as such, can be considered a precursor to identification (Postmes et al., 2019). Thus, this study focuses on the second-order factor of self-investment, which contains 10 items, to assess social identification, consisting of underlying factors of centrality (i.e., the importance and salience of group membership), satisfaction (i.e., positive feelings regarding group membership), and solidarity (i.e., level of commitment towards the

group; Leach et al., 2008).

Previous research has found the self-investment components each showed good to excellent internal consistency, with Cronbach's alpha exceeding .70 (de Souza et al., 2019; La Barbera & Capone, 2016; Lovakov et al., 2015). In addition, previous studies have shown the measure to have good construct, concurrent, and discriminant validity (de Souza et al., 2019; Lovakov et al., 2015). This study found the Cronbach's alphas exceeded .84 for each of the subscales.

4.2.3.2 Basic Psychological Needs. The Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) contains 24 items focused on the experiences of individuals in their place of work and measures need satisfaction and frustration for autonomy, competence and relatedness with each sub-component containing four items (Olafsen et al., 2021). The scale uses a 7-point Likert scale, ranging from 1 (completely disagree) to 7 (completely agree). Previous research found the measure had good internal consistency, construct, concurrent, and discriminant validity with Cronbach's alpha values exceeding .85 for each of the satisfaction and frustration subscales (Olafsen et al., 2021). This study found the Cronbach's alphas exceeded .79 for each of the subscales.

4.2.3.3 Perceived Stress. The Perceived Stress Scale (PSS) is a 10-item measure with two underlying latent factors of helplessness containing 6 items, and self-efficacy containing 4 items (Cohen et al., 1983). The scale uses a 5-point Likert scale, ranging from 0 (never) to 4 (very often). Previous research found the measure had good internal consistency, construct, concurrent, and discriminant validity with Cronbach's alpha values exceeding 0.84 for each of the components (Cohen et al., 1983; Roberti et al., 2006; Taylor, 2015). A two-factor structure was adopted based on recent findings from a meta-analysis (Koğar & Koğar, 2023). This study found the Cronbach's alphas exceeded .85 for each of the subscales.

4.3 Phase 1 - Structural Equation Modelling

In this section, the primary statistical method used was SEM, a multivariate data analytical approach. When conducting SEM, the main aim was to evaluate how much of the hypothesised model was accounted for by the data. SEM consists of two components: the measurement model and the structural model. In brief, the measurement model specifies how the latent variables are measured by the indicators. The structural model is the part of the model that specifies the causal relationships among the latent variables.

4.4 Data Analysis

The software R package lavaan version 0.6-1716 was used for all SEM analyses (Rosseel, 2012). Broadly, the aim of variable-centred approaches is to examine the relationships between variables to produce a model that would predict a set of outcomes (Muthen & Muthen, 2000). The analytic strategy involved the initial assessment of the measurement models using confirmatory factor analysis (CFA), a special case of SEM. This was followed by SEM, which explored hypothesised models based on theoretical priors. The methodological approach taken for this study was confirmatory when assessing the measurement models because the factor structures of the chosen measures had previously been extensively validated across a diverse sample (e.g., de Souza et al., 2019; Koğar & Koğar, 2023; Tang et al., 2021). The second phase examined the structural relationships, which were primarily exploratory, given that the assessed models lacked sufficient empirical evidence.

Broadly, determining the identified model relied on assessing the global and local fit of the measurement and structural models. Model evaluation relies on a set of recommended guidelines from the literature for acceptable cutoff values (Cid et al., 2022). The fit indices adopted for this study are the discrepancy chi-square statistic (Wheaton et al., 1977), root-mean-squared error of approximation (RMSEA; Steiger, 2016), and standardized root mean squared (SRMR) were used; comparative fit index (CFI; Bentler, 1990), Tucker–Lewis index (TLI; Tucker & Lewis, 1973) as comparative fit indices; and the normed chi-square ($\tilde{\chi}^2/df$; Wheaton et al., 1977). A cutoff value close to .95 for the TLI and CFI, and .08 for SRMR.

For RMSEA there are two possible options for assessing model fit. First, use a fixed cutoff typically set at .06. Second, is to conduct hypothesis testing by considering both the point estimate and the associated confidence interval traditionally set at 90% (Chen et al., 2008). For the latter approach, ideally the upper and lower values of the 90% confidence interval are below .05 for good fit, or the lower bound is below .05 and the upper bound is no worse than .08 for acceptable fit (Chen et al., 2008).

Ideally, a nonsignificant chi-square test is desired, but there exist a number of severe limitations to using this test, including dependence on sample size, violation of assumptions, and model complexity (Hooper et al., 2008; Schermelleh-Engel et al., 2003; Tabachnick & Fidell, 2013). When the chi-square test is significant, the alternative normed chi-square can be used with values between two and three indicative of a "good" model fit (Tabachnick & Fidell, 2013; Wheaton et al.,

1977). The initial dataset consisted of 300 participants with no missing data. The test of multivariate normality was violated, and given the sample size of 300, it was recommended to use the maximum likelihood mean-adjusted (MLM) estimation method for SEM (Hu & Bentler, 1999). Outlier detection was conducted using Mahalanobis distance, which identified 19 significant outliers ($p < .01$; Tabachnick & Fidell, 2013). No further outliers were detected, leaving a sample of 281. Inspection of the standard deviations for each observed variable indicated variability in item responses that were all in an acceptable range (Hair et al., 2010). The multicollinearity assumption was assessed by reviewing the bivariate correlation matrix (see Appendix B) and variance inflation factor. These values were within an acceptable range for the variance inflation factor, and the multicollinearity assumption was not violated (Craney & Surles, 2002; James et al., 2013; Stine, 1995).

4.5 Results

Table 1 displays the descriptive statistics for each of the subscales from the BPNSFS, MIIS, and PSS. Figure 1 contains the standardised subscale scores, which were in line with expected reported scores based on the type of subscale and the wording of the items.

Table 1

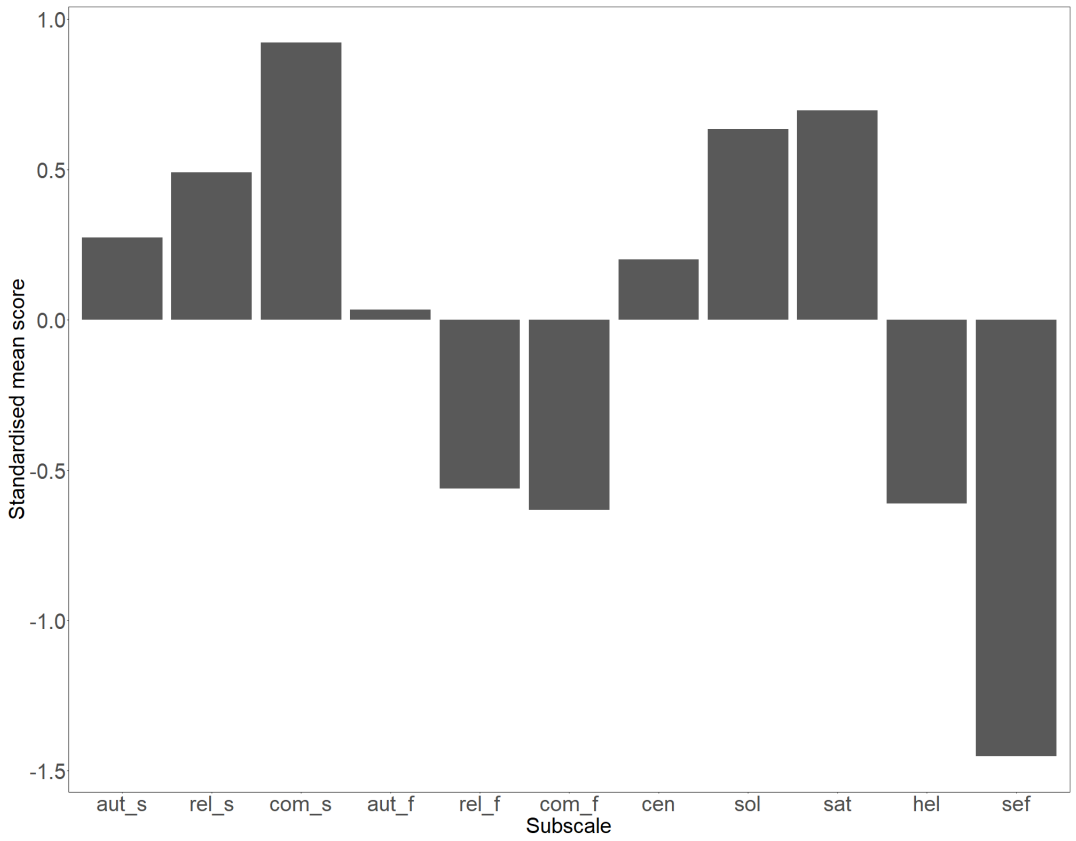
Descriptive statistics and bivariate correlations for the BPNSFS, MIIS, and PSS subscales

	Subscale	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1	BPN Autonomy frustration	3.87	1.37										
2	BPN Relatedness frustration	2.77	1.37	.50*									
3	BPN Competence frustration	2.68	1.40	.47*	.59*								
4	BPN Autonomy satisfaction	4.36	1.21	-.39*	-.16*	-.13*							
5	BPN Relatedness satisfaction	4.76	1.31	-.33*	-.62*	-.30*	.42*						
6	BPN Competence satisfaction	5.47	1.01	-.29*	-.42*	-.66*	.39*	.48*					
7	MIIS Solidarity	5.03	1.44	-.37*	-.62*	-.32*	.45*	.87*	.49*				
8	MIIS Satisfaction	5.15	1.33	-.40*	-.66*	-.33*	.48*	.84*	.48*	.91*			
9	MIIS Centrality	4.25	1.36	-.26*	-.44*	-.16*	.47*	.74*	.34*	.78*	.77*		
10	PSS Helplessness	2.76	0.86	.55*	.42*	.36*	-.25*	-.26*	-.24*	-.28*	-.32*	-.13*	
11	PSS Self-efficacy	1.27	0.86	-.51*	-.40*	-.32*	.24*	.26*	.18*	.28*	.32*	.15*	-.85*

Note. * $p < .05$

Figure 1

Standardised subscale scores for the BPNSFS, MIIS, and PSS



Note. aut = Autonomy, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

4.5.1 Confirmatory Factor Analysis for BPNSFS

The independence model tests the hypothesis that all variables are uncorrelated and was easily rejected with $\chi^2_{SB}(231) = 3470.68$, $p < .01$. Model 1 was the hypothesised model containing the satisfaction and frustration subscales of autonomy, competence, and relatedness. There was support for this model, which showed acceptable model fit with $\chi^2_{SB}(245) = 569.92$, $p < .01$, robust CFI = .91, robust TLI = .90, SRMR = .09, RMSEA = .07, $p < .01$, and $\chi^2/df = 2.33$ (see Table 2). In addition, the composite scores for each of the subscales were all within the recommended range of .70 and .95 (see Table 3), indicating good internal consistency (Hair et al., 2018; Norm O'Rourke & Larry Hatcher, 2019).

Correlated errors can indicate that a measurement error in one observed variable was partially correlated with the measurement error of another. This error can be random or from an underlying cause that affects both items. Several legitimate reasons exist for correlated error terms, including the correlation between items on questionnaires that are reversed or similarly worded (Brown, 2015).

Table 2

Model fit indices for satisfaction subscale from BPNSFS

Model	RMSEA	90% CI		p	CFI	TLI	SRMR	χ^2	df	p	χ^2/df	AIC	BIC
1	.07	.07,	.08	<.01	.91	.90	.09	569.92	245	<.01	2.33	20730.00	20930.11
2	.06	.05,	.07	.04	.94	.94	.08	457.36	244	<.01	1.87	20602.47	20806.21
3	.05	.04,	.06	.26	.95	.95	.07	414.47	243	<.01	1.71	20557.27	20764.66
4	.05	.04,	.06	.48	.96	.95	.07	393.45	242	<.01	1.63	20536.15	20747.17
5	.05	.04,	.06	.49	.96	.96	.07	358.30	220	<.01	1.63	19636.93	19840.68
6	.04	.03,	.05	.80	.97	.97	.06	299.68	199	<.01	1.51	18684.23	18880.70
7	.04	.03,	.05	.94	.98	.97	.06	277.69	198	<.01	1.40	18660.43	18860.54
8	.04	.02,	.05	.98	.98	.98	.06	265.54	197	<.01	1.35	18648.70	18852.45

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, CFI = Comparative normed fit index, df = Degrees of freedom, RMSEA = Root mean squared error of approximation, SRMR = standardised root mean square residual, TLI = Tucker-Lewis index.

Table 3

Composite reliability scores for the BPNSFS

Satisfaction			Frustration		
Autonomy	Competence	Relatedness	Autonomy	Competence	Relatedness
.74	.79	.91	.79	.92	.88

To improve the model fit, covariance parameters were added between the related need frustration and satisfaction subscale error terms. Frustration and satisfaction have previously been found to have a moderately negative relationship (Olafsen et al., 2021). Thus, it is highly likely that some of the variance in the error terms will be shared between the related subscales. These changes were also suggested by the modification index. The modification index provided a one degree of freedom chi-square test of adding a parameter and the impact this would have on the model's chi-square test statistic (Schermelleh-Engel et al., 2003).

Determining whether a model has significantly improved relies on a significant chi-square difference test indicating an improvement over the previous model for nested models (i.e., a model that uses the same variables). Alternatively, for unnested models, smaller values in Akaike information criterion (AIC) and Bayesian information criterion (BIC) can be indicative of an improved model (Brown, 2015).

Introducing correlated error terms in model 2 significantly improved model fit compared

Table 4
Chi-square difference test for BPNSFS

	$\Delta\chi^2$	Δdf	p	ΔAIC	ΔBIC
1 to 2	56.43	1	<.01	127.53	123.90
2 to 3	101.51	1	<.01	45.20	41.55
3 to 4	30.71	1	<.01	21.12	17.49
4 to 5	35.22	22	.04	899.22	906.49
5 to 6	56.35	21	<.01	952.70	959.98
6 to 7	12.07	1	<.01	23.80	20.16
7 to 8	10.18	1	.01	11.73	8.09

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, df = Degree of freedom.

with model 1 $\Delta\chi^2_{\text{diff}}(1) = 56.43$, $p < .01$ (see Table 4). Model 2 showed excellent model fit with $\chi^2_{\text{SB}}(244) = 457.36$, $p < .01$, robust CFI = .94, robust TLI = .94, SRMR = .08, RMSEA = .06, p = .04, and $\chi^2/\text{df} = 1.87$.

Additional changes were adopted one change at a time after the modification index was reviewed. On each occasion, the model was significantly improved over the previous model. These modifications were adopted because the wording of the corresponding items was very similar. For instance, "I feel that my decisions on my job reflect what I really want" for item 7 and "I feel insecure about my abilities on my job" for item 17 were similar in wording.

The introduction of these additional parameters improved the model fit, with model 4 achieving an excellent fit with $\chi^2_{\text{SB}}(242) = 393.45$, $p < .01$, robust CFI = .96, robust TLI = .95, SRMR = .07, RMSEA = .05, $p = .48$, and $\chi^2/\text{df} = 1.63$. It was also significantly different from model 3 $\Delta\chi^2_{\text{diff}}(1) = 30.71$, $p < .01$ (see Table 4).

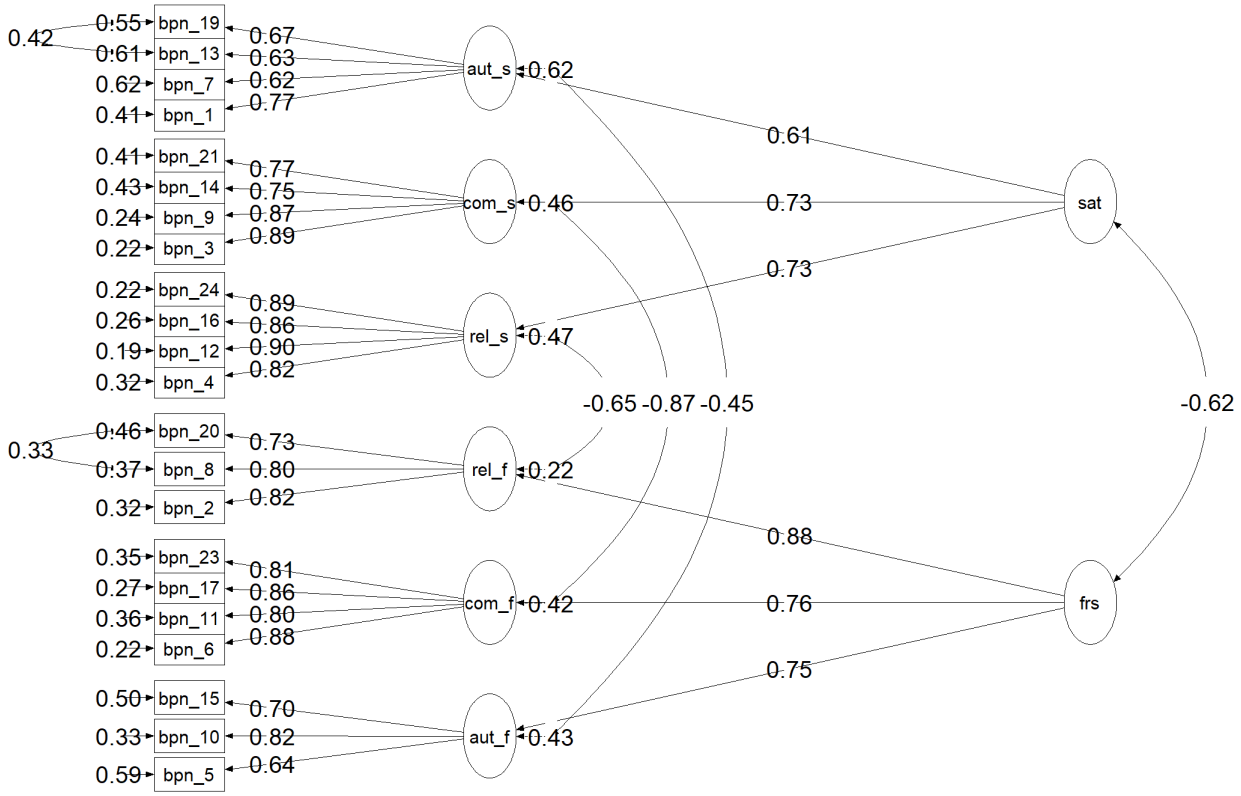
Assessing local fit includes checking that the majority of standardised covariance residuals are below a value of 3, and anything exceeding 4 should be investigated further as this could indicate more serious problems in terms of an unacceptable degree of error (Hair et al., 2010). Examination of the residual covariances identified the vast majority of values to be less than 3, however, there were 3 values in excess of 4. On closer inspection, these cases were associated with item 18 and 22 from the autonomy and relatedness frustration subscales, respectively. Removal of the indicator variable meant that the latent variable had 3 indicator variables remaining, which was

within the recommended range for model identification to be possible (Brown, 2015; Hair et al., 2010; Hayduk & Littvay, 2012).

The unnested model 5 with the indicator item removed was assessed by comparing the difference in AIC and BIC values. The model significantly improved with the removal of item 22, Δ AIC = 899.22, Δ BIC = 906.49, the number of residuals greater than 4 remained at 2 and was associated with item 18, thus it was also removed. This change significantly improved the model, Δ AIC = 952.70, Δ BIC = 959.98, with model 6 achieving excellent model fit with $\chi^2_{SB}(199) = 299.68$, $p < .01$, robust CFI = .97, robust TLI = .97, SRMR = .06, RMSEA = .04, $p = .80$, and $\chi^2/df = 1.51$. There were also no residuals greater than 4.

Figure 2

Confirmatory factor model for the two-factor second-order solution for BPNSFS



Note. aut = Autonomy, com = Competence, _f = Need frustration, frs = Frustration, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction

The squared multiple correlations (R^2) express the indicator reliability and are the squared factor loadings in CFA and SEM. R^2 values for each of the indicator variables exceeded the recommended minimum value of 0.25, ranging from 0.38 to 0.81 (Hair et al., 2010). Each of the standardised coefficients between the observed indicator variables and the unobserved latent variables were all above the recommended cutoff of .50 (Hair et al., 2010; Tabachnick & Fidell,

2013) and found to be significant predictors (see Appendix C for model outputs). The final hypothesised model is shown in Figure 2, showing the standardised coefficients, correlations, and error terms. In figures, circles represent unobserved latent variables, rectangles represent observed variables, the absence of a line between two variables implies a lack of a direct effect, and curved lines denote covariance.

4.5.2 Confirmatory Factor Analysis for MIIS

The independence model was easily rejected, $\chi^2_{SB}(45) = 3219.16$, $p < .05$. Model 1 was the hypothesised model containing the subscales of centrality, satisfaction, and solidarity from the second-order factor of self-investment. There was support for this model, which showed good model fit with $\chi^2_{SB}(32) = 92.71$, $p < .01$, robust CFI = .97, robust TLI = .96, RMSEA = .1, $p < .01$ (see Table 5). The composite scores for each of the subscales were all above the recommended cutoff of .50 for centrality (.86), satisfaction (.95), and solidarity (.95). However, alpha values greater than .95 can be an indication of redundancy within the latent variables meaning that the individual items are tapping into the same features of the latent variable. However, because the values have not exceeded .95, internal consistency was assumed to be acceptable (Hair et al., 2018).

Table 5
Model fit indices for MIIS

Model	RMSEA	90% CI		p	CFI	TLI	SRMR	χ^2	df	p	χ^2/df	AIC	BIC
1	.10	.07,	.12	<.01	.97	.96	.04	92.71	32	<.01	1.35	7167.66	7251.34
2	.07	.05,	.10	.07	.99	.98	.02	64.75	31	<.01	1.34	7131.14	7218.46
3	.07	.04,	.09	.19	.99	.98	.02	55.65	30	<.01	1.32	7119.77	7210.73
4	.06	.02,	.08	.30	.99	.99	.02	49.57	29	.01	1.32	7114.16	7208.76
5	.05	.01,	.08	.49	.99	.99	.02	42.31	28	.04	1.31	7106.16	7204.40

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, CFI = Comparative normed fit index, df = Degrees of freedom, RMSEA = Root mean squared error of approximation, SRMR = standardised root mean square residual, TLI = Tucker-Lewis index.

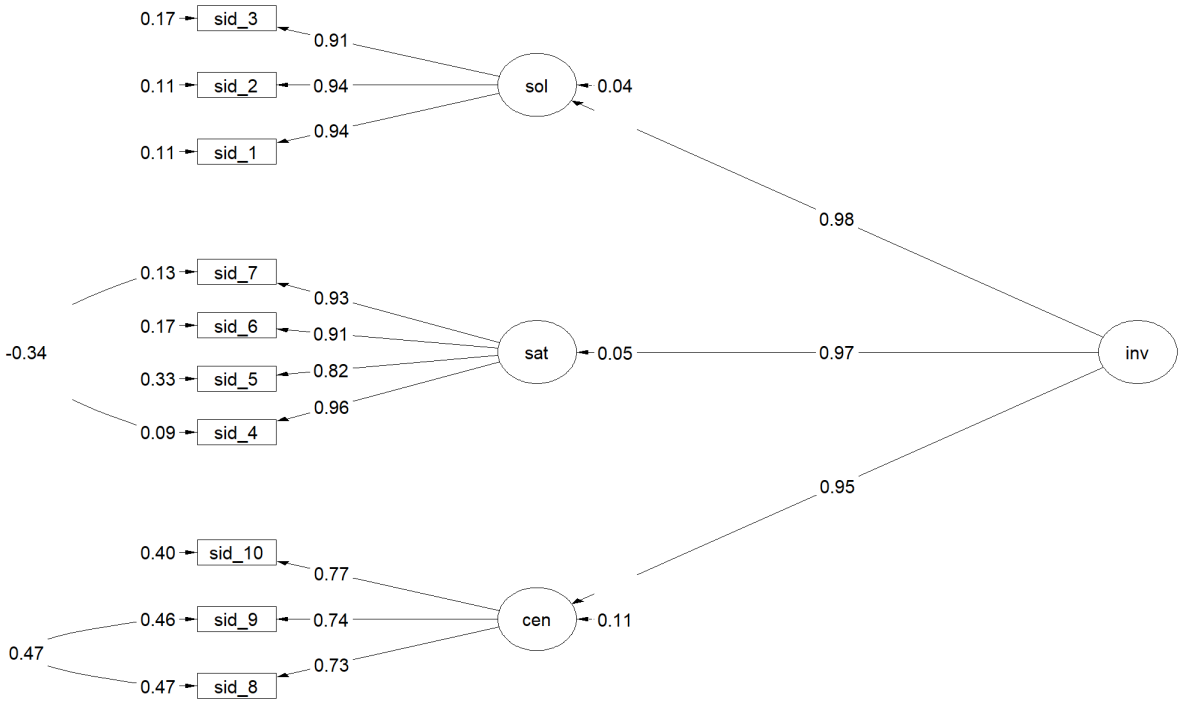
Examination of the modification index indicated four changes to the model to improve model fit through the addition of correlated errors. Theoretically, these improvements are acceptable due to indicator items containing similar or reversed wording. By introducing these additional parameters, the model fit improved to excellent for model 5 with $\chi^2_{SB}(28) = 42.31$, $p = .04$, robust CFI = .99, robust TLI = .99, RMSEA = .05, $p = .49$. Although the chi-square test statistic was nonsignificant, the less stringent RMSEA test was nonsignificant, indicating a good

Table 6
Chi-square difference test for MIIS

	$\Delta\chi^2$	Δdf	p	ΔAIC	ΔBIC
model 1 to 2	22.29	1	<.01	36.52	32.88
model 2 to 3	5.99	1	.01	11.37	7.73
model 3 to 4	6.96	1	.01	5.61	1.98
model 4 to 5	6.32	1	.01	8.00	4.36

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, df = Degrees of freedom.

Figure 3
Confirmatory factor model for the three-factor solution for the MIIS



Note. cen = Centrality, inv = Self-investment, sat = Satisfaction, sid = Social identification, sol = Solidarity

model fit. Each of the model modifications were significantly different from the previous model. More, specifically, model 5 was significantly different from model 4 $\Delta\chi^2_{\text{diff}}(1) = 6.32$, $p = .01$ (see Table 6) also supported by $\Delta AIC = 8.00$ and $\Delta BIC = 4.36$. Examination of the residual covariances identified two values that exceeded 3, and three values that exceeded 2, providing further support to the identified model. R^2 values for each of the indicator variables exceeded 0.25. Each of the standardised coefficients between the observed indicator variables and predicting the unobserved latent variables were all above the .5 cutoff. All coefficients were found to be significant

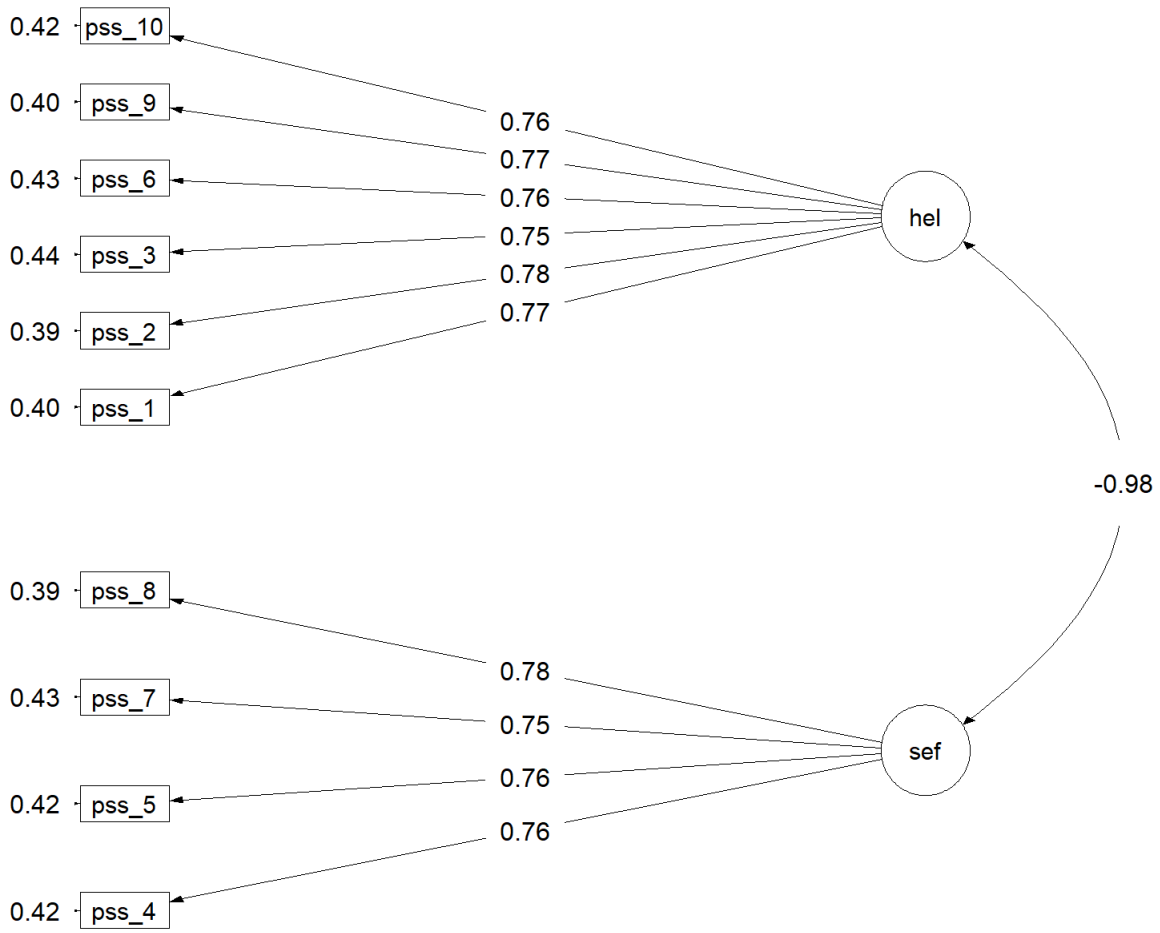
predictors (see Appendix C for model outputs). The final hypothesised model is shown in Figure 3, showing the standardised coefficients, correlations, and error terms.

4.5.3 Confirmatory Factor Analysis for PSS

The independence model was easily rejected, $\chi^2_{SB}(45) = 1874.17$, $p < .05$. Model 1 was the hypothesised model containing a two-factor structure containing latent variables for helplessness and self-efficacy. There was substantial support for this model, which showed excellent model fit with $\chi^2_{SB}(34) = 32.01$, $p = .56$, robust CFI = 1.00, robust TLI = 1.00, SRMR = .02, RMSEA = <.01, $p < 1.00$, and $\chi^2/df = 0.94$.

Examination of the residual covariances identified only one value that exceeded 2. R^2 values for each of the indicator variables exceeded .25, ranging from .56 to .61. Each of the standardised coefficients between the observed indicator variables and predicting the unobserved latent variables were all above the .50 cutoff. All coefficients were significant predictors (see

Figure 4
Confirmatory factor model for the two-factor solution for the PSS



Note. hel = Helplessness, pss = Perceived stress, sef = Self-efficacy

Appendix C for model outputs). The final hypothesised model is shown in Figure 4, showing the standardised coefficients, correlations, and error terms. In addition, the composite scores for each subscale were all within the recommended range for helplessness (.89) and self-efficacy (.85), indicating good internal consistency.

4.5.4 Structural Equation Model Analysis

The hypothesised models examined are shown in Figure 5 to Figure 8 and represented direct and indirect mediation models. The hypothesised models examined the predictors of perceived stress: helplessness and self-efficacy. BPN satisfaction and frustration were second-order factors containing three first-order latent variables of autonomy, competence, and relatedness. Each first-order variable contained either three or four indicator variables. Self-investment was a second-order variable containing three first-order variables of centrality, satisfaction, and solidarity. Perceived stress was represented by the two first-order latent variables of helplessness and self-efficacy. Helplessness contained six indicator variables, and self-efficacy contained four indicator variables.

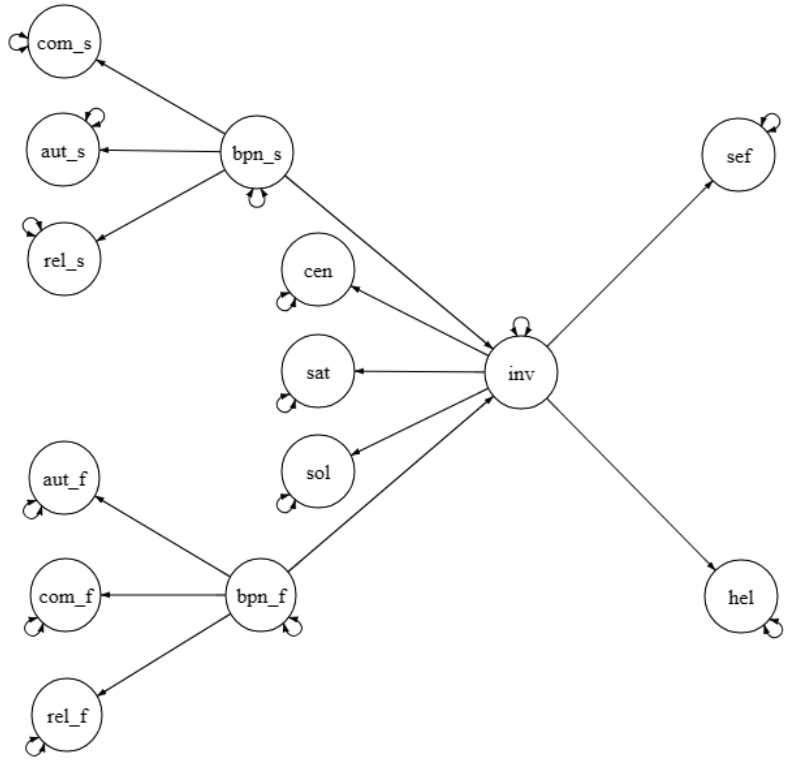
Broadly, the models being explored each depict a pathway where second-order latent variables of BPN (i.e., satisfaction and frustration) and self-investment act as either predictors or mediators to the predicted outcome of perceived stress. The basis for each of the hypothesised models was derived from previous findings from the unified literature that have indicated support for the direct and indirect effects of BPN or social identification as either predictor or mediator where health and well-being are being predicted (e.g., Amiot et al., 2010; Greenaway, Cruwys, et al., 2015; Olafsen et al., 2018; Vander Elst et al., 2012).

In addition, it has been suggested that investigating the role of social identification and relatedness simultaneously could provide useful insights into how relatedness might, for instance, be applied to larger groups (Martela et al., 2021). Therefore, the final hypothesised model examined the relationship between relatedness and the second-order factor of self-investment. This was achieved by including covariance parameters between the two sets of latent variables as shown in Figure 9). The modification index will be reviewed to help make this decision. However, this hypothesised change in the model will only be applied to the best-fitted model from the initial selection from models 1 to 4.

Model 1 assessed the indirect effect of self-investment on the latent variables of helplessness and self-efficacy. Support was found for this hypothesised model, which showed excellent model fit

Figure 5

Hypothesised indirect model for perceived stress predicted by basic psychological needs and mediated through self-investment (model 1)



Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, inv = Self investment, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

Table 7

Structural equation model fit indices

Model	RMSEA	90% CI		p	CFI	TLI	SRMR	χ^2	df	p	χ^2/df	AIC	BIC
model 1	.04	.03,	.05	1.00	.96	.96	.06	1138.62	796	<.01	1.43	31889.46	32278.76
model 2	.04	.03,	.05	1.00	.96	.96	.06	1136.90	794	<.01	1.43	31891.99	32288.57
model 3	.04	.04	.05	.99	.96	.95	.09	1183.54	797	<.01	1.48	31931.86	32317.52
model 4	-	-	-	-	-	-	-	-	-	-	-	-	-
model 5	.04	.03,	.04	1.00	.96	.96	.06	1114.88	794	<.01	1.40	31870.44	32267.02
model 6	.04	.03,	.04	1.00	.97	.96	.06	1103.20	793	<.01	1.39	31859.59	32259.81
model 7	.04	.03,	.04	1.00	.97	.96	.06	1094.44	792	<.01	1.38	31852.46	32256.32
model 8	.04	.03,	.04	1.00	.97	.96	.06	1082.30	791	<.01	1.37	31841.58	32249.08

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, CFI = Comparative normed fit index, df = Degrees of freedom, RMSEA = Root mean squared error of approximation, SRMR = standardised root mean square residual, TLI = Tucker-Lewis index.

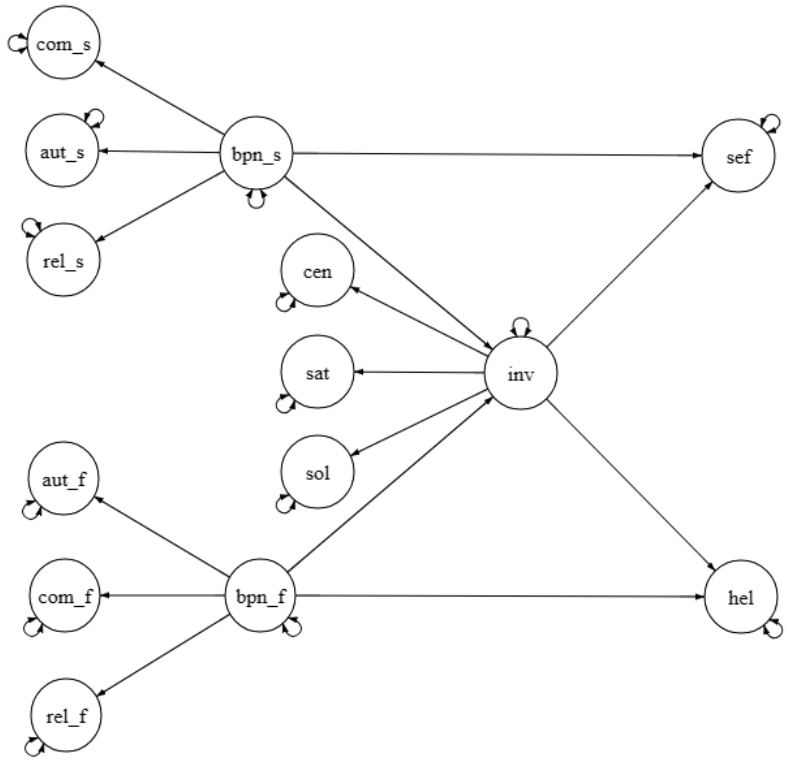
with $\chi^2_{SB}(796) = 1138.62$, $p = <.01$, robust CFI = .96, robust TLI = .96, SRMR = .06, RMSEA = .04, $p = 1.00$, and $\chi^2/df = 1.43$ (see Table 7).

The introduction of a direct effect in model 2 did not lead to a significant difference in model fit compared to model 1 $\Delta\chi^2_{diff}(2) = 1.57$, $p = .46$ (see Table 8). A review of the standardised coefficients and corresponding statistical significance showed that the latent variables of self-investment and BPN satisfaction had a nonsignificant relationship in predicting helplessness and self-efficacy. In addition, the standardised coefficients exceeded a value of 1 for the paths to helplessness from BPN satisfaction and self-investment, which is typically considered a sign of a misspecified model (Hair et al., 2010; Tabachnick & Fidell, 2013).

The difference in AIC and BIC values between models 2 and 3 increased when assessing the indirect model of BPN predicting helplessness and self-efficacy mediated by self-investment, ΔAIC = -39.86 and ΔBIC = -28.95. This indicated that model fit had worsened over the previous model.

Figure 6

Hypothesised direct model for perceived stress predicted by BPN and mediated through self-investment (model 2)



Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, inv = Self investment, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

Table 8

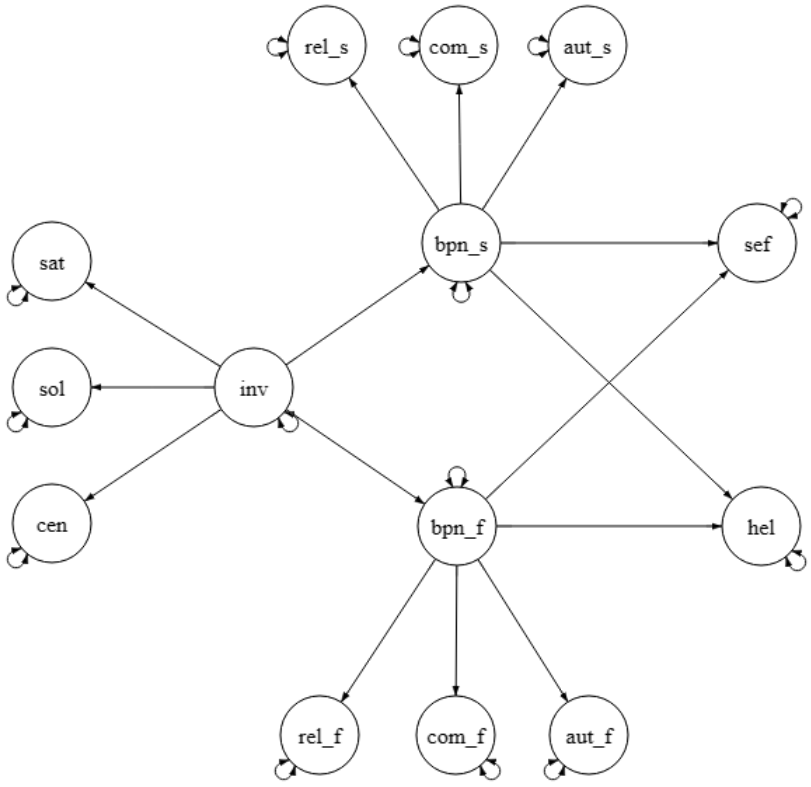
Chi-square difference test for structural equation modelling

Model	$\Delta\chi^2$	Δdf	p	ΔAIC	ΔBIC
1 to 2	1.57	2	.46	-2.54	-9.81
2 to 3	139.91	3	<.01	-39.86	-28.95
1 to 5	65.44	2	<.01	19.02	11.74
5 to 6	8.90	1	<.01	10.85	7.21
6 to 7	9.34	1	<.01	7.13	3.49
7 to 8	11.55	1	<.01	10.87	7.24

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, df = Degree of freedom.

Figure 7

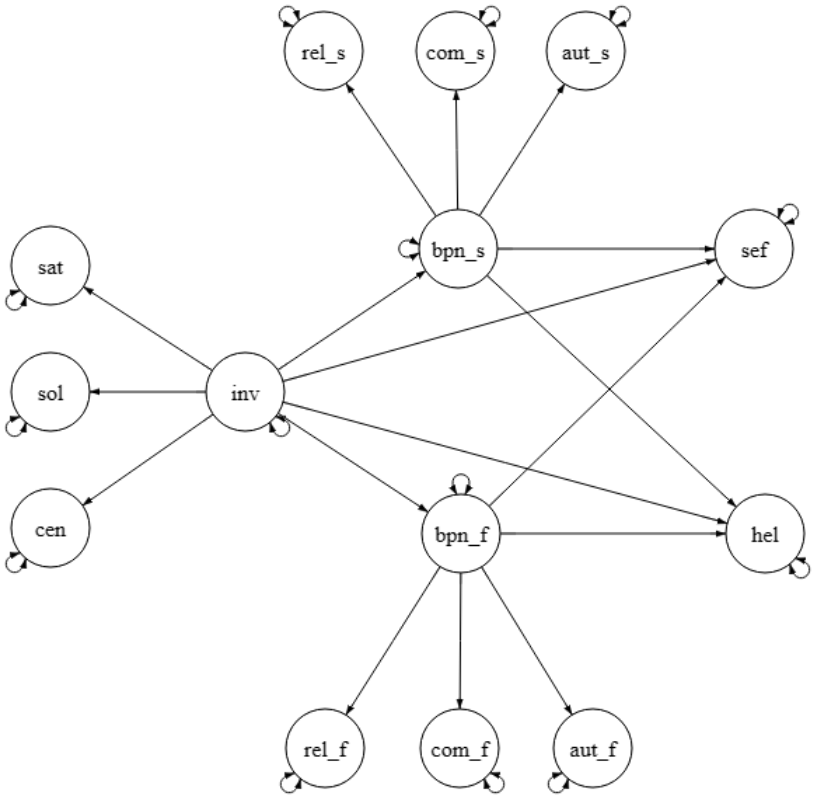
Hypothesised indirect model for perceived stress predicted by self-investment and mediated through basic psychological needs (model 3)



Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, inv = Self investment, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

Figure 8

Hypothesised direct model for perceived stress predicted by self-investment and mediated through BPN (model 4)



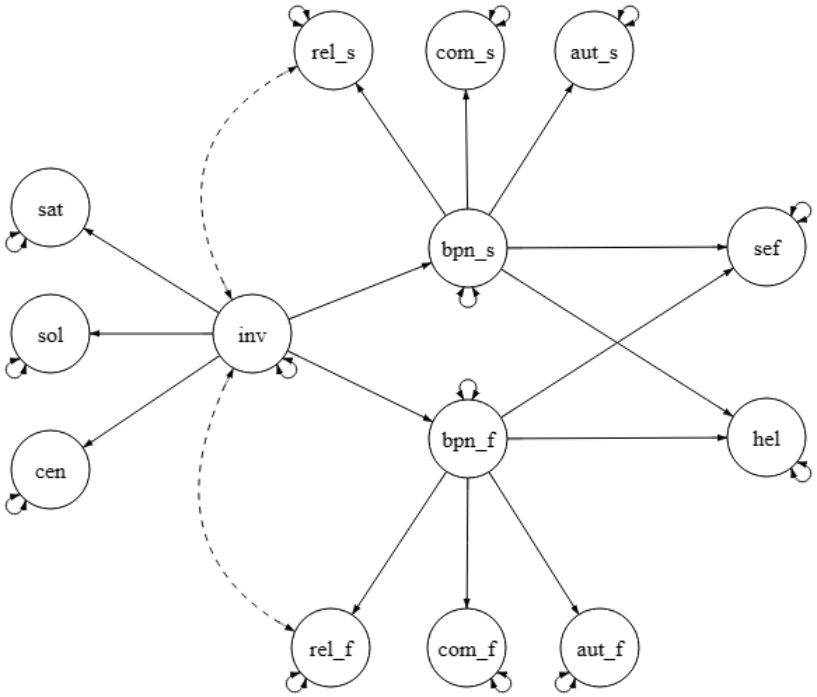
Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, inv = Self investment, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

The coefficients of determination values for model 3 were .11 for helplessness and self-efficacy, which are considered weak and possible indication of a poorly fitted model with poor explanatory powers (Hair et al., 2018; Moksony, 1999). There were also a substantial number of cases ($N = 28$) where the residual covariance exceeded 4. Further support for discarding model 3 was found when model 4 failed to converge. Thus, model 1 was selected as the best-fitting model from the initial hypothesised models (see Appendix D for model outputs). This provided the basis for further exploration.

An examination of the residual covariances for model 1 showed that there were 10 cases where the value exceeded 4, which suggested that the chosen model was not quite correct. The first modification to model 1 was the planned introduction of covariance parameters between the BPN for relatedness (i.e., satisfaction and frustration) and either self-investment or its underlying latent variables. A review of the modification index led to covariances between self-investment and

Figure 9

Prior theoretical model with additional covariance parameters between latent variables of relatedness and self-investment correlated



Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, inv = Self investment, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

relatedness latent variables because of the higher ranking of the relatedness frustration and the high expected parameter change for relatedness satisfaction.

The chi-square difference test found that model 5 was a significant improvement over model 1 with the additional parameters with $\Delta\chi^2_{\text{diff}}(2) = 65.44$, $p = <.01$, $\Delta AIC = 19.02$ and $\Delta BIC = 11.74$. Covariance residuals exceeding 4 were reduced to 3 cases within the data. Whilst not ideal, this number of cases represents less than .4% of total cells.

Additional parameters added to the model from models 5 to 8 were significantly different from the prior model, as shown in Table 8. The changes were made based on reviewing the modification index and selecting entries that made theoretical sense. BPN have been found to be highly correlated both in terms of satisfaction and frustration but also between different needs (Bettencourt & Sheldon, 2001; Van den Broeck et al., 2016). Thus, further covariance parameters were added when identified as offering an improvement to the overall model via the modification index.

Whilst these changes were found to be significantly different with each subsequent model

change, the global fit indices remained broadly the same. None of the model variants was able to achieve a nonsignificant chi-square test statistic. The next step was to assess the local fit to determine whether to accept model 5 or model 8 (see Appendix E for model 8 outputs) as the identified model.

When comparing the number of residual covariances exceeding a value of 4, it remained at one cell in model 8 compared to three cells for model 5. As model 8 does not substantially improve the issue of residual covariance, this was not used for model selection.

To determine whether the modified models significantly differed from the initial hypothesised model 1, bivariate correlations were calculated by comparing the parameter estimates from model 1 to those of the modified models. For models 5 ($r(121) = .95$, $p < .05$) and 8 ($r(121) = .94$, $p < .05$) the high correlation indicated that the parameter estimates from the first and last models are highly related to each other.

The coefficient of determination values were high for model 8 and model 5 for solidarity and satisfaction from the MIIS with scores that exceeded the recommended .90 cutoff. Introducing the covariance parameter between self-investment and relatedness led to the coefficient of determination value for satisfaction of relatedness to reduce to .09 and .03 for models 5 and 8, respectively. This is

Table 9

Indirect mediation analysis for model 8

LHS	OP	RHS	Label	Est	SE	Z	*p*	95% CI		Std
bpn_s		inv	a1	.46	.06	7.45	<.01	.31	.59	.75
bpn_f		inv	a2	-.30	.05	-6.05	<.01	-.42	-.21	-.51
hel		bpn_s	b1	-.05	.06	-0.77	.44	-.19	.11	-.05
hel		bpn_f	b2	.62	.10	6.02	<.01	.43	.86	.64
sef		bpn_s	b3	.04	.06	0.63	.53	-.11	.18	.04
sef		bpn_f	b4	-.57	.09	-6.12	<.01	-.80	-.39	-.61
indirect1	:=	a1*b1	indirect1	-.02	.03	-0.68	.50	-.08	.05	-.04
indirect2	:=	a2*b2	indirect2	-.19	.03	-5.79	<.01	-.26	-.13	-.33
indirect3	:=	a1*b3	indirect3	.02	.03	0.56	.57	-.05	.08	.03
indirect4	:=	a2*b4	indirect4	.17	.03	5.54	<.01	.12	.24	.31

Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, rel = Relatedness, _s = Need satisfaction sat = satisfaction, sef = Self-efficacy, sol = Solidarity.

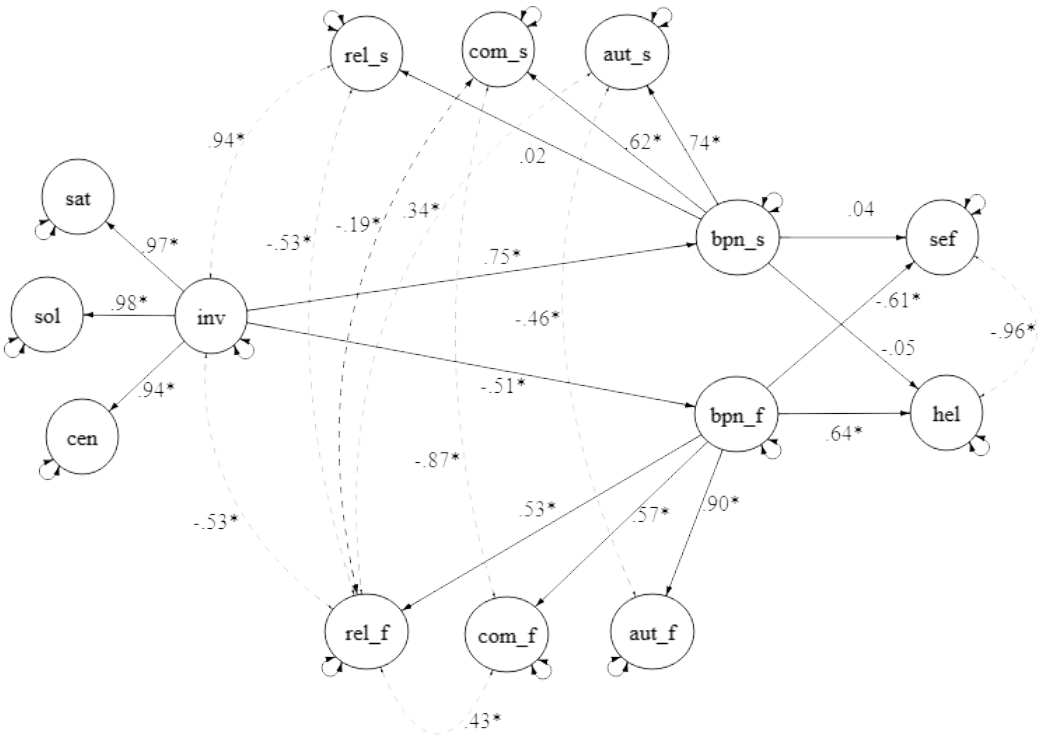
indicative of the latent variable explaining very little effect compared to other variables in the model in predicting helplessness and self-efficacy.

The parameter estimates for each model suggested that model 8 had slightly higher standardised coefficients to the regression pathways than model 5. Where the two models differed was in the variance in helplessness and self-efficacy accounted for by BPN satisfaction and frustration, and self-investment. Model 8 was able to account for 44.30% of the variance in helplessness and 38.90% of the variance in self-efficacy. This contrasts with 31.70% and 28.00% of the variance in helplessness and self-efficacy. Therefore, it was decided that model 8 would be accepted as the identified model shown in Figure 10.

The indirect effects of model 8 were tested using mediation analysis with the results shown in Table 9. Satisfaction of BPN was not a significant mediator between self-investment and helplessness (unstandardised indirect effect coefficient = -.02, p = .50, standardised coefficient = -.04) or self-efficacy (unstandardised indirect effect coefficient = .02, p = .57, standardised coefficient = .03). While greater self-investment increased in satisfaction of BPN this led to a

Figure 10

Accepted structural regression model for the indirect relationship of self-investment to perceived stress mediated by basic psychological need



Note. aut = Autonomy, bpn = BPN, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, inv = Self investment, rel = Relatedness, _s = Need satisfaction, sat = Satisfaction, sef = Self-efficacy, sol = Solidarity

negligible increase in self-efficacy and decrease in helplessness.

When BPN frustration acted as a mediating variable for self-investment, the resultant indirect effects were found to be significant in predicting self-efficacy (unstandardised indirect effect coefficient = .17, p = <.01, standardised coefficient = .31) and helplessness (unstandardised indirect effect coefficient = -.19, p = <.01, standardised coefficient = -.33). Thus, greater self-investment was associated with a decrease in frustration of BPN, which led to a decrease in helplessness and greater self-efficacy.

4.6 Discussion

The main findings from Phase 1 showed that the identified model had excellent global fit and very good local fit, underpinned by well-fitted measurement models for self-investment, need satisfaction and frustration, and perceived stress components. It included a significant indirect path from self-investment to the two facets of perceived stress, mediated by need frustration. Contrarily, need satisfaction did not significantly mediate the relationship between self-investment and perceived stress. Previous studies have indicated that need satisfaction might be a stronger predictor of self-efficacy and need frustration more closely linked to helplessness, which was not supported by the results of this study (e.g., Rouse et al., 2020; Santana-Monagas & Núñez, 2022).

Within the identified model, frustration of relatedness was the strongest predictor of the second-order factor of need frustration. Additionally, self-investment was the main predictor in the indirect mediation pathway to perceived stress. The unobserved first-order latent variables of centrality, satisfaction, and solidarity possessed equally strong and significant loadings on the second-order factor of self-investment. As highlighted previously, the pathway was mediated significantly by need frustration and nonsignificantly by need satisfaction.

In Phase 2, the data analysed in Phase 1 were used to conduct LPA to compare and contrast the methods used in each phase. The expectation was that LPA would identify two or more latent profiles or subgroups, highlighting a key difference between variable- and person-centred approaches. Where variable-centred approaches excel in explaining the relationships between variables, this is at the expense of identifying possible heterogeneity within a sample, which person-centred approaches can identify (Muthen & Muthen, 2000).

4.7 Phase 2 - Latent Profile Analysis

LPA is a modelling technique that aims to uncover 'hidden' or latent profiles that represent smaller subgroups that exist within the wider population (Spurk et al., 2020; Williams & Kibowski,

2016). The capability of LPA to assign individuals to latent profiles that capture the heterogeneity that is often present in the population but can be unobserved by variable-centred techniques like SEM (Bates et al., 2013; Muthén & Muthén, 2002). Moreover, underpinning LPA is the principle that each latent profile represents a subgroup reflected by a set of unique mean values, which also differentiates it from other subgroups (Muthén & Muthén, 2002). Thus, LPA uses individuals' responses on a set of observed continuous indicators to describe the probabilities of their belonging to different latent groups. Using a person-centred approach can supplement findings from variable-centred research with its greater focus on individuals rather than the aggregation across the population as a whole (Gustafsson, Carlin, et al., 2018).

4.8 Data Analysis

LPA was conducted using R version 4.3.1 and the tidyLPA package version 1.1.0 (Rosenberg, 2018) on variables from the MIIS, BPNSFS, and PSS. Assumptions were previously assessed prior to the SEM analysis, and because multivariate normality was violated, the MLR estimation method will be adopted when conducting the LPA. A number of studies have recommended a minimum sample size of 500 for conducting LPA (Nylund et al., 2007; Spurk et al., 2020). A review of the published literature where LPA was the primary methodology found a diverse range of sample sizes from less than 150 to over 10,000, and in approximately 45% of studies, sample size was less than 500 (Spurk et al., 2020). Two simulation studies contest this general rule of thumb. First, it was found that sample sizes of 300 were relatively similar to larger samples from 500 to 1000 in their bias and coverage when entropy, a fit index, was greater than .80, with similar findings for small sample sizes ($N < 200$) where entropy was greater than .90 (No & Hong, 2018). Second, in a separate study, the findings suggested that sufficient statistical power was achievable even when subgroups were small (i.e., $N > 19$) as long as profile separation was expected to be relatively large (Dalmaijer et al., 2022). Thus, the current sample size of 281 was considered acceptable for conducting LPA.

When conducting LPA, there are different models that specify how the means, variances, and covariances of the observed variables vary across the groups. There are four models available for LPA: variances equal across classes, covariances fixed at zero (i.e., EEI); class-varying variances, covariances fixed at zero (i.e., VVI); variances and covariances equal across classes (i.e., EEE); and class-varying variances and covariances (i.e., VVV). The models as presented here are in order of decreasing parsimony (Wardenaar, 2021). For each model, the profile-specific means are estimated

for each of the k number of profiles. Determining which configuration contains the best fitting model requires comparing different models and numbers of groups using various fit indices.

For LPA, the following model fit indices were relied on: AIC, sample-size adjusted BIC (SABIC), BIC, boot-strap loglikelihood ratio test (BLRT), Lo-Mendell-Rubin adjusted loglikelihood ratio test (aLRT), and entropy (Sinha et al., 2021; Vrieze, 2012). While AIC and BIC are recommended when the sample size is small, the SABIC has been found to work well when using primarily continuous variables (Morgan et al., 2015; Sinha et al., 2021). Thus, it will be necessary to balance these different criteria in selecting the most appropriate configuration (Nylund-Gibson et al., 2014).

Smaller AIC, BIC, and SABIC values, and entropy closer to 1 all indicate better model fit (Spurk et al., 2020). These are initially reviewed to select the most appropriate configuration. Once a configuration is selected, it is necessary to determine the appropriate number of latent profiles. This involves reviewing the same model fit indices whilst also taking into account the aLRT and BLRT, which test whether the model with k latent profiles significantly ($p < .05$) improves model fit compared model with k - 1 (Spurk et al., 2020; Williams & Kibowski, 2016). It is recommended that the chosen model is the one directly before which aLRT and BLRT are statistically non-significant. It is also possible for the BLRT value to remain significant for the entire series (Bauer, 2022; Spurk et al., 2020). Yet, the fit indices are not the only criteria, and consideration should also be given to the theoretical and practical implications of a specific model, such as the size, the meaning, and the stability of the groups (Dalmaijer et al., 2022; Sinha et al., 2021). Thus, the chosen model should make good theoretical sense (Bauer, 2022).

The approach taken for conducting the LPA will be exploratory rather than confirmatory, primarily because the variables used within the SEM have not been used together in previous research. A recent review of vocational behaviour research found that of the 39 studies that used LPA, 36.9% were predominantly exploratory and 63.0% were confirmatory (Spurk et al., 2020). Additionally, exploratory LPA will often focus on identifying the number of latent classes or profiles as the primary task and involve an extensive review of model specifications and number of classes (Spurk et al., 2020).

4.9 Results

The models were tested for the gradual inclusion of latent profiles up to and including nine profiles. Based on the BLRT, the EEI model continued to show significant values for each

additional profile that was added to the model up to the last comparison between models containing 8 and 9 profiles (see Table 10). In comparison, the VVI model a five-profile structure (see Table 11), EEE model suggested a six-profile structure (see Table 12), and the VVV model suggested a four-profile structure (see Table 13). Entropy was greater than .80 for each model and, in most cases, was around .90.

Table 10
EEI model fit statistics for determining the optimal number of profiles

Profiles	LL	AIC	BIC	SABIC	BLRT	*p*	Profile comparison	Entropy
1	-4382.54	8809.08	8889.12	8819.36				1.00
2	-3875.76	7819.52	7943.22	7835.41	1013.56	<.01	1 vs 2	.95
3	-3777.43	7646.86	7814.22	7668.36	196.66	<.01	2 vs 3	.87
4	-3597.69	7311.39	7522.41	7338.50	359.47	<.01	3 vs 4	.89
5	-3519.04	7178.08	7432.77	7210.80	157.30	<.01	4 vs 5	.90
6	-3495.07	7154.14	7452.48	7192.47	47.94	<.01	5 vs 6	.90
7	-3420.67	7029.33	7371.33	7073.26	148.81	<.01	6 vs 7	.90
8	-3401.77	7015.54	7401.21	7065.09	37.79	<.01	7 vs 8	.90
9	-3313.44	6862.89	7292.21	6918.04	176.65	<.01	8 vs 9	.92

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, BLRT = Boot-strap loglikelihood ratio test, LL = Log likelihood, SABIC = Sample-size adjusted BIC

The number of profiles was determined according to a combination of AIC, BIC, SABIC, BLRT and entropy values in the final model. The EEE model contained the lowest values for each of the fit indices. More specifically, the model contained six profiles (AIC = 6279.75, SABIC = 6343.79) and a model containing one profile (BIC = 6700.47). The BIC value for the model containing six profiles (BIC = 6778.21) was still one of the lowest values across the range of models. Thus, the evidence indicated that the EEE model containing six profiles was the most appropriate model based on the AIC, SABIC, BLRT, and entropy values, and would be investigated further.

Figure 11 shows the six profiles and descriptive statistics are in Table 14. Five out of six profiles contained more than 20 members, with the exception of profile 2, with 16 members. When this occurs, it is advisable to review the average profile probabilities (see Table 15). Having reviewed the average posterior profile probabilities, the value for profile 2 was .97, which indicated a

Table 11

VVI model fit statistics for determining the optimal number of profiles

Profiles	LL	AIC	BIC	SABIC	BLRT	*p*	Profile comparison	Entropy
1	-4382.54	8809.08	8889.12	8819.36				1.00
2	-3856.08	7802.16	7965.89	7823.20	1052.92	<.01	1 vs 2	.95
3	-3723.56	7583.12	7830.53	7614.90	265.04	<.01	2 vs 3	.87
4	-3610.79	7403.59	7734.68	7446.12	225.54	<.01	3 vs 4	.89
5	-3448.64	7125.27	7540.04	7178.55	324.32	<.01	4 vs 5	.90
6	-3432.11	7138.21	7636.67	7202.24	33.06	.12	5 vs 6	.95

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, BLRT = Boot-strap loglikelihood ratio test, LL = Log likelihood, SABIC = Sample-size adjusted BIC

Table 12

EEE model fit statistics for determining the optimal number of profiles

Profiles	LL	AIC	BIC	SABIC	BLRT	*p*	Profile comparison	Entropy
1	-3133.16	6420.32	6700.47	6456.31	63.82			1.00
2	-3101.25	6380.49	6704.31	6422.09	32.94	<.01	1 vs 2	.87
3	-3084.78	6371.56	6739.03	6418.76	45.43	.06	2 vs 3	.81
4	-3062.06	6350.13	6761.26	6402.94	54.98	<.01	3 vs 4	.83
5	-3034.57	6319.15	6773.94	6377.57	63.39	<.01	4 vs 5	.86
6	-3002.88	6279.75	6778.21	6343.79	-17.88	<.01	5 vs 6	.89
7	-3011.82	6321.63	6863.75	6391.28	-17.88	1.00	6 vs 7	.85

Note. AIC = akaike information criterion, BIC = bayesian information criterion, BLRT = boot-strap loglikelihood ratio test, LL = log likelihood, SABIC = sample-size adjusted BIC

probability of 97% of belonging to profile 2 versus a 3% chance of belonging to any other profile. The recommended ideal cutoff for the diagonal values for profile probabilities is .90, but values of .80 could be acceptable if, for example, the model is theoretically supported. Values below .80 are considered unacceptable (Muthen & Muthen, 2000; Weller et al., 2020). Additionally, a review of the individual profile members probabilities also revealed that values were all above .90. Thus, although the profile membership size was below 20, the profile probabilities supported the inclusion of profile 2. The size and distinctiveness of the remaining profiles provided further support.

Table 13

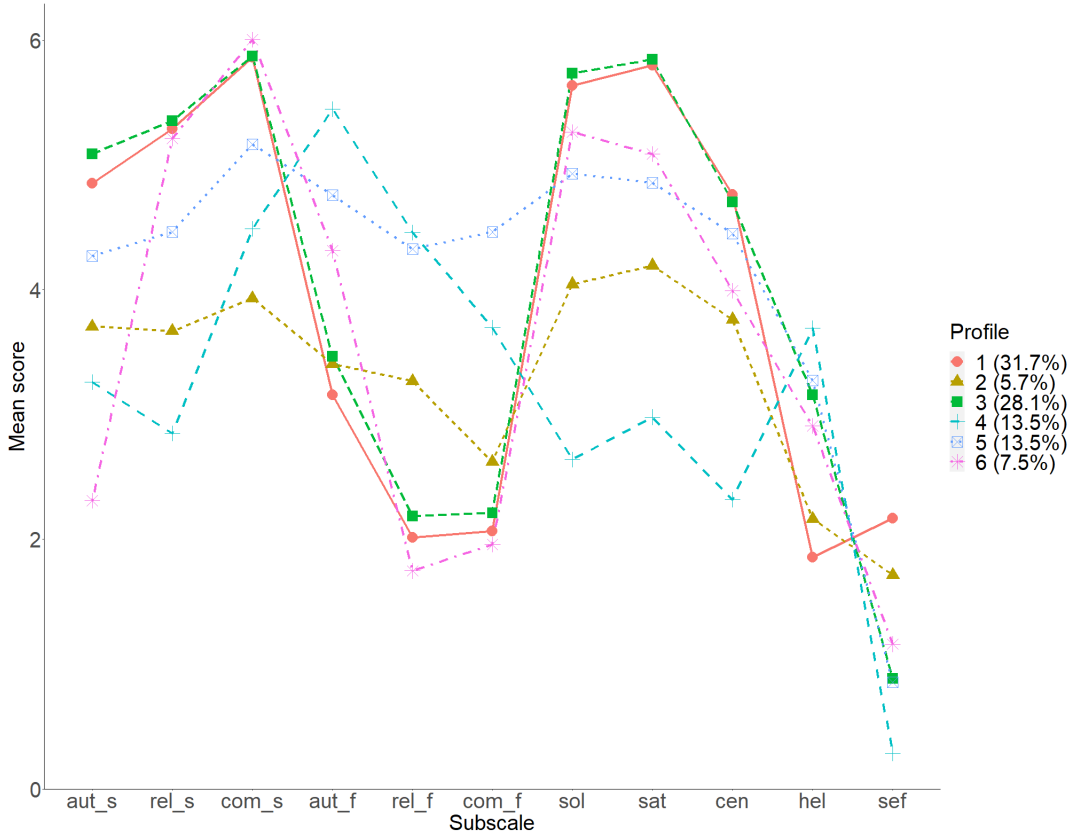
VVV model fit statistics for determining the optimal number of profiles

Profiles	LL	AIC	BIC	SABIC	BLRT	*p*	Profile comparison	Entropy
1	-3133.16	6420.32	6700.47	6456.31				1.00
2	-2994.24	6298.48	6862.42	6370.93	277.84	<.01	1 vs 2	.95
3	-2937.63	6341.25	7188.99	6450.15	113.23	<.01	2 vs 3	.87
4	-2874.23	6370.45	7501.98	6515.81	126.80	<.01	3 vs 4	.89
5	-2850.58	6479.17	7894.49	6660.99	47.28	.81	4 vs 5	.94

Note. AIC = Akaike information criterion, BIC = Bayesian information criterion, BLRT = Boot-strap loglikelihood ratio test, LL = Log likelihood, SABIC = Sample-size adjusted BIC

Figure 11

The latent profile for basic psychological needs, social identification, and perceived stress



Note. aut = Autonomy, cen = Centrality, com = Competence, _f = Need frustration, hel = Helplessness, rel = Relatedness, _s = Need satisfaction, sat = satisfaction, sef = Self-efficacy, sol = Solidarity.

4.9.1 Latent Profiles

The members of latent profile 1 experienced high need satisfaction and identification with positive outcomes. The latent profile (N = 89, 31.67%) contained the largest proportion of

Table 14

Mean, standard deviation, and analysis of variance difference tests for basic psychological needs, self-investment, and perceived stress

Subscale	Profile 1 N = 89 31.67%		Profile 2 N = 16 5.69%		Profile 3 N = 79 28.11%		Profile 4 N = 38 13.52%		Profile 5 N = 38 13.52%		Profile 6 N = 21 7.47%		Pairwise comparisons
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Autonomy Frustration	3.16	0.96	3.40	0.82	3.47	1.20	5.45	1.11	4.76	0.89	4.31	1.67	4, 5 > 1, 2, 3; 4 > 6; 6 > 1, 3
Relatedness Frustration	2.01	0.83	3.27	0.99	2.19	0.90	4.46	1.03	4.32	0.80	1.75	0.80	4, 5 > 1, 2, 3, 6; 2 > 1, 3, 6
Competence Frustration	2.06	0.93	2.62	1.01	2.21	1.12	3.70	1.45	4.46	1.05	1.96	0.90	4, 5 > 1, 2, 3, 6
Autonomy Satisfaction	4.85	0.77	3.70	0.95	5.09	0.77	3.26	1.11	4.27	0.93	2.31	0.81	1, 3 > 2, 4, 5, 6; 6 > 2, 4, 6; 2 > 6
Relatedness Satisfaction	5.29	0.98	3.67	0.93	5.35	0.80	2.85	1.01	4.46	1.04	5.21	1.14	1, 3 > 2, 4, 5; 2, 5 ,6 > 4; 6 >2
Competence Satisfaction	5.86	0.70	3.93	0.61	5.87	0.78	4.49	1.11	5.16	0.72	6.00	0.66	1, 3, 6 > 2, 4, 5; 5 > 2, 4
Solidarity	5.64	1.07	4.04	0.93	5.73	0.83	2.64	1.00	4.93	0.84	5.26	1.22	1, 3 > 2, 4, 5; 2 > 4; 5 > 2; 6 > 2, 4
Satisfaction	5.80	0.95	4.19	0.80	5.85	0.75	2.98	0.97	4.86	0.80	5.09	1.14	1, 3 > 2, 4, 5, 6; 2, 5, 6 > 2; 6 > 4
Centrality	4.76	1.06	3.76	0.85	4.70	1.13	2.32	0.85	4.45	0.99	3.99	1.50	1, 3 > 2, 4, 6; 2, 5, 6 > 4
Helplessness	1.85	0.48	2.16	0.44	3.16	0.50	3.69	0.41	3.27	0.61	2.91	0.63	3, 4, 5, 6 > 1, 2 4 > 3, 5, 6; 5 > 6
Self-efficacy	2.17	0.56	1.71	0.57	0.88	0.50	0.29	0.38	0.85	0.55	1.16	0.66	1, 2 > 3, 4, 5, 6; 4 > 3, 5, 6

Table 15

Average latent class probabilities and standard deviations for most likely latent profile membership

Profile	1		2		3		4		5		6	
1	.94	(.11)	.01	(.06)	.04	(.09)	.00	(.00)	.00	(.01)	.00	(.01)
2	.02	(.05)	.97	(.06)	.00	(.00)	.00	(.01)	.00	(.01)	.00	(.00)
3	.05	(.10)	.01	(.03)	.91	(.14)	.01	(.03)	.03	(.07)	.01	(.05)
4	.00	(.00)	.01	(.03)	.03	(.08)	.93	(.15)	.03	(.10)	.01	(.03)
5	.01	(.03)	.00	(.00)	.04	(.09)	.05	(.12)	.89	(.16)	.01	(.03)
6	.02	(.04)	.00	(.01)	.01	(.01)	.02	(.10)	.03	(.09)	.92	(.15)

members and defined people who typically scored above average for need satisfaction and below average for need frustration. Their scores were also above average for each of the self-investment components. This group also had an average score for helplessness, which was the lowest of all profiles, and the highest score for self-efficacy.

The members of latent profile 2 experienced low need satisfaction and identification. The

latent profile ($N = 16$, 5.69%) contained the fewest members from the sample. The pattern of scores were relatively flat across each subscale. There was a slightly higher score on competence satisfaction and a lower score on competence frustration. This subgroup also had the second-lowest helplessness score and second-highest self-efficacy score.

The members of latent profile 3 experienced high need satisfaction and identification with negative outcomes. The latent profile ($N = 79$, 28.11%) contained the second largest proportion of individuals and defined people who typically scored above average for need satisfaction and below average for need frustration. Their scores mirrored profile 1 for all subscales except helplessness and self-efficacy, which were both found to be significantly different ($p < .05$) based on analysis of variance tests (see Appendix F for raw outputs). The helplessness score for profile 3 was the third highest of all profiles, while self-efficacy was the second lowest.

The members of latent profile 4 ($N = 38$, 13.52%) experienced high need frustration. This latent profile was distinct in that the profile contained the lowest mean scores for self-esteem and the highest mean scores for helplessness. While the subgroup's mean score for competence satisfaction and frustration was their most adaptive, they were still significantly worse than 3 out of the 6 remaining subgroups on almost every other subscale. This was then reflected in significant differences in helplessness and self-efficacy mean scores, with both being the highest and lowest scores across the six profiles.

The members of latent profile 5 ($N = 38$, 13.52%) experienced high need satisfaction and frustration and shared some similarities with profile 2 in terms of distribution of scores, albeit that the scores are significantly higher in all subscales excluding centrality, autonomy and relatedness satisfaction. The other large discrepancy was observed in mean scores for helplessness and self-efficacy. Profile 5 had the second-highest mean score for helplessness and the second-lowest for self-efficacy.

The members of latent profile 6 ($N = 21$, 7.47%) experienced asymmetric autonomy reflected in high autonomy frustration and low autonomy satisfaction scores. This contrasted with low need frustration and high satisfaction in the remaining subscales, which shared similarities with profiles 1 and 3. A similar pattern was observed for the need frustration subscales. The mean scores for helplessness and self-efficacy were found to be significantly better for profiles 1 and 2.

4.10 General Discussion

This chapter examined the relationship between SDT and the SIA, focused on BPN and social identification. More specifically, in what way did the underlying concepts of need satisfaction and frustration interact with workplace identification to influence employees' perceived stress? The decision was made to employ a variable- and person-centred approach. The variable-centred approach, SEM, provided an aggregated and global model that described the relationships between variables, quantified the strength of these pathways, and predicted the outcome variables of perceived stress (e.g., Muthen & Muthen, 2000). In contrast, the person-centred approach, LPA, provided a method for determining whether the same population contained heterogeneity by uncovering subgroups (e.g., Myers et al., 2018). Thus, combining variable- and person-centred approaches enabled a comparison of how well the latent variables observed in the wider population reflected the heterogeneous groups of individuals. Before completing this comparison, the findings from the SEM will be discussed, followed by the results of the LPA, and lastly, by directly comparing the two approaches.

4.10.1 The Identified Model

The identified model from Phase 1 had excellent global fit and very good local fit. Underpinning this ideal model were the excellent fitted measurement models accounting for self-investment, need satisfaction and frustration, and components of perceived stress. The identified model contained a significant indirect path between self-investment and perceived stress components, mediated by need frustration and supports findings from previous unified research (e.g., Greenaway, Cruwys, et al., 2015). Overall, the model broadly indicated that an increase in self-investment led to a decrease in BPN frustration, which mediated the relationship to perceived stress components. Increases in BPN frustration led to decreases in self-efficacy and increases in helplessness. This provided partial support for the first research question and was broadly in line with previous research from SIA, SDT, and the unified literature (e.g., Gillet, Fouquereau, et al., 2012; Haslam & Ellemers, 2005).

There was also support for the third research question observed in the significant covariance of error terms between BPN satisfaction and frustration of relatedness with the second-order factor of self-investment. Relatedness satisfaction loaded more strongly onto self-investment than did relatedness frustration. Notably, relatedness frustration remained a significant latent variable in predicting BPN frustration.

More generally, BPN satisfaction was a nonsignificant mediator in the indirect path between self-investment and the components of perceived stress. Past research suggested that need satisfaction was likely to be a better predictor of self-efficacy and need frustration more strongly associated with helplessness (e.g., Rouse et al., 2020; Santana-Monagas & Núñez, 2022; Van den Broeck et al., 2016). There are two possible explanations for this finding. First, in the initial model, the weaker factor loadings observed for autonomy and competence onto BPN satisfaction would be suggestive of unmet needs (Deci & Ryan, 2002). Healthy functioning is reliant on the satisfaction of each BPN, although autonomy has been shown to be especially important for optimal functioning (e.g., Deci et al., 2001; Van den Broeck et al., 2008). The problem was compounded further by the significance of BPN frustration in both the initial and identified models. However, two of the self-efficacy items, although framed positively, included terms with negative connotations such as "irritations" and "personal problems". Therefore, it is possible that these could have been experienced similarly to helplessness when participants completed the survey. An examination of the bivariate correlations indicated that each BPN satisfaction factor was more weakly correlated to helplessness and self-efficacy than the corresponding frustration factors. Thus, it would seem that the lack of functional relevance of BPN in the model is most likely attributable to item wording.

Within the identified model, self-investment was the main predictor in the indirect mediation pathway to helplessness and self-efficacy. The unobserved first-order latent variables of centrality, satisfaction, and solidarity all possessed strong and significant factor loadings onto self-investment. It would appear that they each contributed equally to explaining the variance in self-investment to the extent that there was little to distinguish the individual contributions to the overall model.

4.10.2 The Six Subgroups

Overall, the person-centred analysis uncovered six latent profiles that each described a distinct and qualitatively different subgroup. There were several noteworthy findings that provided support for the research questions (H4 and H5). Asymmetry was observed in a number of the latent profiles. This was observed across the BPN satisfaction and frustration subscales (e.g., higher BPN satisfaction and lower BPN frustration) and also within the BPN higher order factors (e.g., higher autonomy and lower competence satisfaction).

The subgroups that demonstrated the asymmetrical profile were the two high satisfaction

and identification, the high need frustration, and the low satisfaction and identification profiles. Yet, all the latent profiles exhibited asymmetry, to a greater or lesser extent, across the separate BPN for satisfaction and frustration subscales. The asymmetric autonomy latent profile was the clearest example where autonomy satisfaction was more than 3 points lower than relatedness satisfaction and, similarly, autonomy frustration was over 2.5 points higher than relatedness frustration subscale. Both findings are in line with previous research that has highlighted the existence of asymmetry in latent profiles (e.g., Chevrier & Lannegrand, 2022; Rouse et al., 2020). For most of the profiles the asymmetry between BPN satisfaction and frustration subscales was in line with expectations, such as higher satisfaction was matched by lower frustration having been reported. There were differences between the corresponding pairs of BPN satisfaction and frustration subscales that were not accounted for by the asymmetry. For example, across each subgroup, the reported level of autonomy frustration was higher than for competence frustration, while the pattern was reversed for the corresponding satisfaction subscales. In contrast to the asymmetry observed in the BPN subscales, self-investment was found to have limited variability across centrality, satisfaction, and solidarity, characterised by quantitative rather than qualitative differences, meaning that subgroups were only differentiated by the magnitude of subscale scores.

The combination of higher need satisfaction, lower need frustration, and higher self-investment were typically associated with higher self-efficacy and lower helplessness scores. Previous research from the unified approach have reported similar findings (e.g., Amiot et al., 2010; Chatzisarantis et al., 2009; Greenaway et al., 2017). Yet, there were some exceptions. The high autonomy frustration latent group had, on average, reported greater levels of BPN frustration. Additionally, the high satisfaction and identification latent group with negative outcomes demonstrated how even with high need satisfaction, low need frustration, and high self-investment, this subgroup had the third highest helplessness and third lowest self-efficacy scores.

There were two findings that could not be fully accounted for by the data. First, the low satisfaction and identification latent profile had a relatively flat profile and, yet, reported much healthier scores for helplessness and self-efficacy than all but one subgroup. Second, the two high satisfaction and identification subgroups were only differentiated by the degrees of helplessness and self-efficacy being healthy for one and less healthy for the other. A possible explanation was that there are other confounding factors causing these unexplained findings. Considering the significance of BPN in fostering motivation, it is likely that this is the underlying factor that would explain the

results of these subgroups. For instance, if one group was experiencing their behaviour as intrinsically motivated and the other was not, then this might explain the difference in outcomes (e.g., Deci & Ryan, 2008; Ryan & Deci, 2017a). Alternatively, these examples might be distinguished by the adoption of different strategies for maintaining or improving their current social status (e.g., Tajfel & Turner, 2004). Given the cross-sectional design, it is impossible to say whether members of these groups would remain in these same subgroups if followed up at subsequent time points (e.g., Cece et al., 2018).

4.10.3 Taken Together

Broadly, the variable-centred approach identified need frustration as the only significant mediator in the indirect relationship between self-investment and the outcomes of helplessness and self-efficacy. Satisfaction of BPN was a nonsignificant and very weak predictor of helplessness and self-efficacy, which was not in line with previous evidence (e.g., Rouse et al., 2020; Santana-Monagas & Núñez, 2022). However, this finding did fit the observed correlations between need satisfaction, need frustration and the two outcome variables. The results of the LPA were not in agreement with the main finding of the SEM that BPN satisfaction was a nonsignificant predictor of helplessness and self-efficacy. Rather, the six latent profiles showed that the variation in subscale distributions relied equally on need satisfaction and need frustration to distinguish different subgroups.

Where the model and latent profiles were in agreement was the lack of explanatory power in the components of self-investment. In the structural model, the components had similar factor loadings on self-investment. Across the latent profiles, on average, the difference in the combined score for self-investment differentiated one latent profile from another rather than between individual components. Similarly, the latent profiles supported the finding from the structural model that indicated a stronger association between self-investment and need satisfaction. This is because the pattern in scores between need satisfaction and self-investment was more closely aligned than was the case for need frustration.

The structural model and latent profiles also agreed on the importance of autonomy and, in particular, autonomy frustration. Within the ideal model, autonomy frustration had the largest standardised coefficient loading on to BPN frustration. Autonomy frustration was, on average, the highest BPN frustration subscale for each latent profile and a mean score greater than autonomy satisfaction. The reason for this finding might well be related to the timing of the study, which was a few months after the UK Government had lifted the "Stay at home" order because of the

coronavirus pandemic. The greater need frustration may reflect this difficult time when people were compelled to stay home and restrict social contact (e.g., Šakan et al., 2020; Vermote et al., 2022). Even though the restrictions had been removed at the time of the study, it is possible that the transition to more "normal" work practices influenced some of the reported findings and led to a strong explanatory role of need frustration in the model.

4.10.4 Relatedness and Social Identification

As previously highlighted, relatedness satisfaction and frustration subscales were made to covary with the second-order factor of self-investment, with the relationships found to be significant in the SEM analysis. The error terms of relatedness frustration significantly covaried with the error terms of self-investment while also significantly predicting the second-order factor of BPN frustration. The covariance between the error terms of relatedness satisfaction and self-investment were the only significant relationships in the model. An examination of the bivariate correlations showed that relatedness satisfaction and frustration were moderately to strongly associated with each self-investment factor, although the satisfaction factor was much more strongly correlated. Moreover, the correlations were stronger between the self-investment factors than with autonomy and competence.

The relatedness frustration factor was more strongly correlated to the perceived stress factors, which was likely a reflection of their negative outcomes (e.g., Rouse et al., 2020; Santana-Monagas & Núñez, 2022). Moreover, this explanation might also apply to the stronger correlation between relatedness satisfaction and the self-investment factors as both are positively framed. This hypothesis was further supported by the stronger pathway observed between self-investment and the second-order factor of BPN satisfaction. Additionally, relatedness frustration was moderately correlated to helplessness and self-efficacy, which was a stronger association than each self-investment factor. Had self-investment been treated as a unitary measure, this might have increased the level of correlation rather than spreading the variance across each component.

The findings from the LPA provided further evidence for the dynamic relationship between social identification and relatedness. The SEM suggested that the individual factors contributed equally to predicting the second-order factor of self-investment. This was broadly confirmed by the differences in the self-investment factors across latent profiles being quantitative rather than qualitative. Yet, the two high satisfaction and identification subgroups, and the asymmetric

autonomy subgroup shared very similar score distributions for relatedness and competence satisfaction and frustration subscales. The asymmetric autonomy subgroup diverged in terms of autonomy (satisfaction and frustration), and each self-investment factor. This result provided evidence for the independence between self-investment and relatedness and suggests that each factor measures a different feature of the group processes, likely interpersonal and intragroup relations.

Overall, the results from this study have provided initial support to the possible interplay between relatedness and social identification, highlighting the dynamic but independent relationship. Yet, a great deal more needs to be done to understand this relationship and whether it can provide a link to applying SDT principles to larger groups (Martela et al., 2021).

4.10.5 Strengths and Limitations

By conducting both variable- and person-centred analysis in this study, it was possible to demonstrate the strengths of each approach. These will be briefly discussed. First, the LPA uncovered several latent profiles that reflected the heterogeneity in the data. The variable-centred approach suggested that BPN frustration, rather than BPN satisfaction, mediated the relationship between self-investment and perceived stress outcomes. Thus, each approach was able to offer unique insights about these data. Thus, future research could benefit from adopting a mixed methods approach, especially in cases where it is likely or unclear if heterogeneity exists in the population being investigated (Muthen & Muthen, 2000; Myers et al., 2018).

As previously stated, the unified approach to SIA and SDT has seen BPN treated as an averaged global score in some studies (e.g., Amiot et al., 2010; Greenaway et al., 2017). This study uniquely examined BPN satisfaction and frustration for autonomy, competence, and relatedness, which was a first for a unified approach study. Had a global measure been used in this study, it would have masked the observed qualitative differences. As such, the findings highlight the importance of adopting a measurement approach that is consistent with the main tenets of the SDT framework. Additionally, the study examined the link between relatedness and social identification, and this provided initial findings into understanding how they operate independently of each other.

There was a lack of variability observed in the self-investment subscales of centrality, satisfaction, and solidarity. Rather, the differences observed were quantitative rather than qualitative. Thus, in the case of self-investment, consideration should be given to whether using a multi-item measure of social identification is likely to offer additional insights beyond a global measure.

The cross-sectional design of this study provided useful preliminary evidence that shaped the remaining studies in this thesis, particularly Chapter 6. However, the findings were somewhat limited because of the cross-sectional design, with the timing of the study possibly influencing the results. Thus, an important next step was to extend the person-centred approach to include a longitudinal design for the purpose of understanding how the uncovered subgroups behave over time.

4.10.6 Summary

Overall, the combination of using variable-centred and person-centred forms of analysis has allowed a useful comparison between the two approaches. The analysis highlighted a number of shortcomings for both approaches, such as the latent profiles being unable to fully account for some of the unexpected patterns of scores, suggesting other factors were involved in explaining helplessness and self-efficacy.

In the next chapter, an experimental design was adopted to examine group performance associated with priming a meaningful social identity and promoting a competence-supportive environment. Previous research has suggested that when individuals experience a greater sense of social identification or support for competence, performance improves (e.g., Cerasoli et al., 2014). The next study applied a combined priming effect to an intergroup setting to determine whether the same benefits to performance were observed.

5 MANIPULATION OF SOCIAL IDENTIFICATION AND BASIC PSYCHOLOGICAL NEEDS

5.1 Introduction

The previous chapter examined the components of social identification and basic psychological needs (BPN) within the context of workplace teams. At the population level, the relationship between social identification and employee perceived stress was mediated by BPN frustration. Notably, this relationship held for both helplessness and self-efficacy, where the literature had suggested that need satisfaction would likely mediate positive outcomes like self-efficacy. The timing of the study, shortly after a period of national lockdown during the coronavirus pandemic, was suggested as a possible cause for this finding. In addition, latent profile analysis (LPA) was conducted on the same data and identified several distinct subgroups. However, there were latent profiles that could not be fully explained, which was argued to be related to an unobserved factor, likely the motivational continuum.

In this chapter, the experimental study focused on the effects of priming BPN satisfaction and greater social identification for the purpose of affecting improved group performance. This attended to the broader thesis aims by contributing towards the continued exploration of the relationship between key concepts of the social identity approach (SIA) and self-determination theory (SDT) frameworks, examining the effects of SDT and SIA on performance, but, more specifically, the combined effects of support for BPN and social identification. The current study examined whether performance could be influenced by providing support for competence and facilitating a greater sense of social identification in a competitive environment through the use of a choice reaction task.

The findings from this study have important implications for groups that contain individuals who fall into less adaptive profiles associated with poorer outcomes, as presented in the previous study (Chapter 4). Interventions that can foster satisfaction of BPN or greater social identification would promote better outcomes for these individuals and their groups (e.g., Chatzisarantis et al., 2009; Ntoumanis et al., 2021). Thus, using an experimental design facilitated the comparison of priming satisfaction of BPN or greater social identification on performance. Moreover, by combining the priming effects of both, it was possible to compare them against the individual impacts of each concept.

5.1.1 Experimental Studies from a Unified Approach Perspective

The previous chapters highlighted the paucity of research concerned with a unified approach to studying the SIA and SDT. Several of the unified studies relied on experimental design with the aim of manipulating different factors from the underlying frameworks to examine the effect on some distal outcomes, with well-being being the most common (e.g., Greenaway, Cruwys, et al., 2015; Thomas, Amiot, et al., 2017; Yampolsky & Amiot, 2013). Broadly, the results from studies that explored changes in social identity found that facilitating greater experiences of identification was associated with 1) satisfaction of BPN (Greenaway, Cruwys, et al., 2015); and 2) self-determined behaviour (Amiot et al., 2012, 2014; Thomas, Amiot, et al., 2017). The only study focused on manipulating self-determined motivation found that this factor was not as important as the level of social identification in predicting well-being, albeit that motivation was used to quantify the reasons for identifying with a particular group (Yampolsky & Amiot, 2013). Thus, these studies provided evidence for facilitating social identification and SDT concepts (e.g., motivation) that affect various outcomes. However, the paucity of unified studies means it was necessary to draw on findings from the literature of the separate frameworks to understand their influence on performance.

5.1.2 Competence Support Through a Motivational and Social Identity Lens

Two studies exist that, when taken together, offer an indirect examination of the unified approach by adopting an almost identical methodology whilst changing the theoretical lens used to view the findings (Fransen, Vansteenkiste, et al., 2018; Fransen et al., 2015). The studies examined the effect of team leader support or discouragement on performance in an experimental design sporting task (Fransen et al., 2015). The experimental design employed across both studies involved a passing task and a dribbling–shooting task. The primary difference between these studies was in the theoretical perspectives used to frame the findings.

The main findings across both studies demonstrated that positive feedback improved team performance. The way the feedback was conceptually framed was highly specific to the theoretical stance in the separate studies. When the SDT framework was the primary focus, the outcome of a team leader expressing competence-supportive feedback led to participants experiencing increased intrinsic motivation and boosted performance (Fransen, Vansteenkiste, et al., 2018). In contrast, when leader behaviour was considered from a SIA perspective and feedback from the team leader was framed as 'confidence in the likely success of the team', overall team confidence and

performance were improved (Fransen et al., 2015).

At first glance these results would suggest a great degree of overlap. Yet, understanding the results from either perspective becomes problematic because one cannot easily disentangle the role of competence support versus the facilitation of social identification. The findings from Study 1 (Chapter 4) provided evidence for the different degrees of BPN and social identification across the separate latent profiles. The study also found that relatedness satisfaction and, to a lesser degree, frustration were closely related to self-investment. Furthermore, autonomy and competence frustration were found to predict BPN frustration, which mediated the relationship between social identification and perceived stress. Thus, the findings from Study 1 indicate the possible role of BPN across the two studies by Fransen and colleagues (Fransen, Vansteenkiste, et al., 2018; Fransen et al., 2015), especially where SIA has been drawn on to frame the results. Furthermore, these two studies illustrated the importance of adopting a unified approach for the purpose of better understanding when and how each component affects the outcomes of studies such as these. Additionally, these studies provided evidence for the positive outcomes as a consequence of facilitating changes in social identity processes and BPN in relatively controlled settings.

5.1.3 Competence Support and Basic Psychological Needs Satisfaction

Satisfaction of autonomy, competence, and relatedness help facilitate autonomous forms of motivation, psychological growth, and well-being (Deci & Ryan, 2000; Ntoumanis et al., 2021; Teixeira et al., 2012). However, in promoting intrinsically motivated behaviour, previous research has demonstrated the positive influence in the context of more performance-oriented outcomes (e.g., Fransen, Vansteenkiste, et al., 2018; Gillet et al., 2010). A recent meta-analysis shed light on the association between BPN, rewards, and performance, offering several important insights (Cerasoli et al., 2016). Although the BPN were found to predict performance, competence was found to be the strongest predictor, with relatedness only a weak predictor. Furthermore, incentives linked to achieving an explicit goal undermined autonomy, whereas a vaguely specified goal had the opposite effect. More importantly, when autonomy was no longer undermined and the controlling nature of the explicit incentive was removed, competence was also found to be enhanced. Moreover, the results indicated that the mere presence or absence of incentives had no impact on BPN ability to predict performance. These findings also strengthen support for examining the separate BPN (e.g., Quested et al., 2013).

Research on the effects of perceived competence support has been associated with

competence satisfaction and self-determined motivation, which subsequently mediate positive outcomes, such as improved performance and well-being (Berntsen et al., 2019; Fransen, Boen, et al., 2018; Fransen, Vansteenkiste, et al., 2018; Losier & Vallerand, 1994; Mertens et al., 2018). When individuals receive feedback, it often includes valuable information about their individual performance level and how this compares to other individuals' performance (Mouratidis et al., 2008). The manner in which feedback is provided can influence whether it is perceived as constructive or harmful to future task performance (e.g., Fransen, Vansteenkiste, et al., 2018). Additionally, who provides the feedback can further influence whether performance is boosted.

For instance, when athlete leaders were perceived to support competence by offering positive feedback (e.g., "Great passing. Keep going!") to team members in experimental conditions, intrinsic motivation and performance were found to increase (Fransen, Boen, et al., 2018; Fransen, Vansteenkiste, et al., 2018; Mertens et al., 2018). However, when feedback was provided by a coach, either in addition to or instead of an athlete leader, differences emerged. Athletes who received feedback from the athlete leader and coach saw a performance increase beyond those who received feedback from only one source (Fransen, Boen, et al., 2018). Conversely, it was observed that performances improved following feedback from the athlete leader or coach. However, only feedback from the athlete leader was linked to enhanced feelings of competence satisfaction and motivation (Mertens et al., 2018).

The authors proposed several explanations for this outcome, such as the coach's feedback being perceived as controlling, the authenticity of the feedback being questioned, or the volume of feedback from the athlete leader being perceived as innovative and inspiring. Thus, whether feedback is received as competence-supportive is highly dependent on the social agent and the content of their feedback being positive and encouraging. If not, the outcome could lead to competence frustration (Fransen, Vansteenkiste, et al., 2018). For example, research investigating parental influence on children's sports enjoyment discovered that increased pressure from the parent, such as demands for improved training, correlated with higher amotivation and reduced enjoyment for the child (Sánchez-Miguel et al., 2013).

Additionally, research has demonstrated the mutually reinforcing effects of BPN satisfaction and activity engagement, albeit that these effects have been seen over the longer term (e.g., Curran et al., 2016). Thus, the satisfaction of one BPN facilitates the satisfaction of all three BPN. This aligns with a main tenet of SDT. For example, satisfaction of competence and

relatedness are reliant on autonomy being satisfied as this involves the regulation of behaviour (Ryan & Deci, 2017b). However, a lack of competence would mean that an individual's behaviour cannot be perceived as originating from the self, undermining a sense of autonomy (Ryan & Deci, 2017b). Thus, the interdependence of BPN is crucial to understanding the motivational and behavioural outcomes.

5.1.4 Social Identity Approach and Group Performance

The SIA framework offered an explanation of the mechanisms through which group performance can be explained (Haslam, 2004). Performance would be expected to improve when a social identity is made salient because the process is argued to make group behaviour happen (Turner, 1982). For example, Høigaard and colleagues (2013) found that when team identification was increased through a team-building activity prior to competing in a cycling time trial, group members were much more likely to exert greater effort than they would as an individual. Moreover, the group's performance was significantly better than a group where social identity had not been made salient. The intergroup competition that was created in this study has also been found in other studies to be a critical and necessary element for team identification to enhance performance (James & Greenberg, 1989; van Dick et al., 2009; Worchel et al., 1998). For instance, the study by Worchel and colleagues (1998) found that the absence of intergroup competition led to a decrease in productivity even under the conditions of a social identity being made salient. Additionally, monetary rewards were offered to groups for achieving certain outcomes (e.g., if worst performing group members performance better than average). They were argued to enhance the group's shared social identity rather than directly affecting performance. This was because the performance of a group of individuals who were informed that they would receive a reward if their personal contribution exceeded a set target was found to be less productive than those in the group reward conditions. Defining what constitutes a good performance can be complex when dealing with groups. When a social identity is made salient, group members are likely to define what is considered a good performance in terms of what aligns with the values held by the ingroup (Haslam, 2004). Under certain conditions, the possibility exists for the ingroup's definition to be in conflict with those who set the rules, such as researchers or managers (Diehl & Stroebe, 1987; Nijstad et al., 2006). Performance can be viewed within this context as a social judgment (Haslam, 2004).

5.1.5 Feedback and Goals from a Social Identity Approach Perspective

Another important aspect to consider is the role of feedback within the context of the SIA. The findings from the study by Fransen and colleagues (2015) demonstrated that the feedback from leaders perceived to be part of an ingroup was received as more positive, facilitating increased performance levels of other group members. This finding has been replicated in other experimental studies (Fransen et al., 2016; Mertens et al., 2018; Rees et al., 2013; Sankaran, 2012; Slater et al., 2018). For instance, a study examined the role of feedback when participants were told that their performances were poor whilst blindfolded (Rees et al., 2013). The perceived poor performance of participants worsened or improved after receiving negative or positive feedback, respectively, from an ingroup member. In addition, motivation was said to have contributed to the increase in performance because participants wanted to prove ingroup members right when they provided positive feedback and prove outgroup members wrong when presented with negative feedback.

Similarly, feedback was examined in the context of group assignment based on being a member of either the training champions (i.e., performances were assessed to be better in training versus competition) or competition champions (i.e., performances were assessed to be better in competition versus training; Sankaran, 2012). When the training champions received negative feedback from their coach their performances worsened. In contrast, for those labelled as competition champions, positive feedback contributed to improvements in performance during training, while negative feedback had no effect.

Lastly, in the context of shared goals, a study examined the influence of different goal conditions (Wegge & Haslam, 2005). Small groups were asked to complete a brainstorming task under four group goal conditions. Those in the group directed to 'do your best' performed the worst out of the four groups. Conversely, when more specific goals were set, these groups experienced increased team identification and performed equally well but significantly better than the 'do your best' group. Even when the goals for a group were predetermined, these effects were observed and supported the facilitative nature of shared group goals in directing collective effort.

5.1.6 Summary and Rationale

In sum, the findings from the literature presented in this chapter have highlighted the way in which social identity salience and SDT concepts can be affected by external conditions, including intergroup competition or incentives (e.g., Cerasoli et al., 2016; Hoigaard et al., 2013). From the perspective of BPN, competence was found to be the strongest predictor of performance when

incentives were introduced. Typically, in the context of the SIA, making salient a social identity has been found to improve performance under conditions of intergroup competition. Only a small number of studies have adopted a unified approach and generally focused on well-being outcomes rather than performance (Thomas, Amiot, et al., 2017; Yampolsky & Amiot, 2013). Thus, this study aimed to examine the extent to which group performance could be enhanced by increasing team identification and providing support for competence in the context of intergroup competition. The decision to focus on support for competence and not relatedness was primarily to avoid conflating the effects of relatedness with the priming for social identification. Thus, the social identification priming should show a change in scores independent of changes in the relatedness measure. The research hypotheses for Study 2 were:

- H1: providing a competence-supportive environment will significantly improve reaction times from the first to the last trial.
- H2: making salient the team identity will significantly improve reaction times from the first to the last trial.
- H3: Combining the effects of making the team identity salient and providing a competence-supportive environment will significantly improve reaction times compared with either team identity or competence-support being provided separately.
- H4: Reported levels of social identification should change independently of the degree of reported relatedness.
- H0: There will be no changes in the response times based on priming of team identification and competence satisfaction.

5.2 Method

5.2.1 Participants

To determine an appropriate sample size G*Power (Faul et al., 2007) version 3.1.9.7 was used. A small-to-medium effect size was decided on based on the findings from past choice reaction time studies, which have examined the association between reaction times and, for example, age-related slowing (e.g., Woods et al., 2015), and found small-to-medium effects when examining experimental interactions (e.g., Woods et al., 2015; Ziv & Lidor, 2021). For the planned ANOVA to detect a small-to-medium effect size with appropriate levels set for power (.80) and alpha (.05), a

sample of 250 participants (46% male; Mx_{age} = 36.61, SD = 4.60) was required (Faul et al., 2007). The difference in mean age between the experimental groups ranged from 35.64 to 37.36. All participants were recruited directly through the Prolific crowd-sourcing platform, as described previously.

5.2.2 Procedure

Ethical approval was obtained from the Staffordshire University Ethics Committee. Participants received information about the study before agreeing to participate with consent provided electronically. Participants who took part were asked to complete an experimental task and a survey at completion (see Appendix G). Participants were randomly assigned to one of five groups to complete a complex response task online utilising the PsyToolkit (Stoet, 2010), which hosted the online experiment. This study employed a post-test-only with control group experimental design.

The Deary-Liewald task (Deary et al., 2011) constitutes a choice response task whereby participants respond to the presentation of an 'X' in one of four boxes on the screen, represented by one of four keys (i.e., X, C, B, N) on a computer keyboard. Consequently, participants were required to participate using a personal computer or laptop, with all other devices excluded.

Empirical evidence from studies using a choice reaction task has demonstrated a number of ways in which performance can be affected. As the age of participants increases, so does the time it takes to respond to presented stimuli (e.g., Deary et al., 2011; Dykiert et al., 2012). Thus, participants were aged between 30 to 45 years old to minimise the age-related effects of the reaction time task (Deary et al., 2011). There were no further exclusion criteria. Additionally, introducing incentives for performance on reaction-style tasks has consistently been found to facilitate performance but only when the incentive is presented before the task (e.g., Anderson & Yantis, 2012; Failing & Theeuwes, 2017). Lastly, research on choice reaction times has shown that distractions and external stressors are associated with poorer cognitive performance, such as longer reaction times or committing a greater number of errors (e.g., Damaso et al., 2022; Muley et al., 2016; Shinde et al., 2014).

Participants were asked to complete 90 responses over three trials on the complex reaction task and an average reaction time was calculated for each trial. Before the three trials, participants were asked to complete a practice trial of 10 responses. Trials would appear on screen for one second (i.e., 1000ms) with a random period of time, from 500 to 3000 milliseconds, between

responding and the next stimuli being presented. Where participants did not respond within one second, the response was registered as an error. All errors were removed from an individual's responses, with all participants having at least 85% of responses per trial.

There were four experimental manipulations and a control group. The control group was asked to complete the same task with 90 responses across three trials. No further information was provided to the control group. Two primary manipulations were utilised to achieve the experimental groups. First, to achieve a high or low team identification, participants were informed that their performance would be aggregated with other participants working together to achieve a "bonus payment" to one of two charities. The chosen charities were determined using YouGov data from 2020 for the most familiar and popular charity (i.e., Cancer Research UK) for the high team identification (i.e., high importance, high meaningfulness) and the least familiar and popular (i.e., Open Society Foundations) for low team identification (i.e., low importance, low meaningfulness). Whilst the organisation does have political roots, the relatively low familiarity suggested that it would be highly unlikely that participants would have strong attitudes or beliefs regarding the organisation. Support for competence was accomplished by providing positive feedback broadly in keeping with previous research (e.g., Fransen, Boen, et al., 2018; Fransen, Vansteenkiste, et al., 2018; Fransen et al., 2015). The positive feedback contained normative information on the participant's performance and reminded them of the overall goal. This was felt to be sufficiently motivating and supporting competence satisfaction. Conversely, the absence of positive or negative feedback regarding the participant's performance was used as the counter position to the high competence support experimental group and is referred to as the 'low' experimental condition for support for competence.

For the high identification manipulation, participants were presented with the following information before engaging in the first trial:

> "You have been randomly assigned to Team One and the scores for everyone in Team One will be used to calculate an average reaction time for you and your team. This average reaction time will be compared with the time achieved by other participants competing for Team Two. Should your Team's average time be faster than the average reaction time of Team Two then your team will earn a donation to Cancer Research UK."

To maximise the likelihood that the feedback was chiefly linked to fostering a competence-

supportive environment, it was displayed simply on the screen. Research from the social identity approach literature suggests that feedback from ingroup representatives can influence performance (e.g., Fransen et al., 2015; Rees et al., 2013). Consequently, presenting the information with images or symbols related to charity could have reinforced social identity instead of merely supporting competence. Thus, to foster a high degree of support for competence, participants were given feedback on their performance after each trial of 30 responses. The groups that received no feedback regarding their performance were only told that they had completed a particular trial and would shortly begin the next trial. The feedback to foster a high degree of support for competence presented after each trial:

> "When comparing your results to others who have completed the same test, you performed very well. If you keep up this level, you will increase the likelihood of your group achieving the desired performance for Cancer Research UK to receive the bonus payment. Continue to do your best, keep up the good work, and potentially even improve it. We will now continue with the trials."

Thus, the five groups were: 1) high competence - high team identification (High CM-High TI), 2) high competence - low team identification (High CM-Low TI), 3) low competence - high team identification (Low CM-High TI), 4) low competence - low team identification (Low CM-Low TI), and 5) a control group. At the end of the three trials, participants completed four validated measures outlined below. Additionally, participants were asked to indicate what group they had taken part in based on the instructions provided to participants as one form of manipulation check. For instance, participants in the High CM-High TI were expected to select the two statements: "On the previous task, my team's performance will be used to determine if a donation is made to Cancer Research UK" and "I received written feedback after each trial on the task".

A post-test-only with control group experimental design was used for this study. As such, participants were asked to complete a selection of measures on motivation, basic psychological needs, and social identification once they had completed the experiment. It was felt that presenting the measures pre-test might have caused interference with the manipulations by providing participants with valuable information about the purpose of the study (e.g., Fayant et al., 2017; Hauser et al., 2018). The addition of a control group acted as a baseline for comparison with the other experimental groups in terms of the priming effects of the manipulations.

5.2.3 Measures

5.2.3.1 Intrinsic Motivation. The Intrinsic Motivation Inventory (IMI) was initially developed in an experimental setting and later adapted for use in the context of sport (McAuley et al., 1989; Ryan, 1982). The full scale consisted of 45 items made up of 7 subscales. For the purpose of this study, only the interest and enjoyment subscale was used. The scale uses a 7-point Likert scale, ranging from 1 (not at all true) to 7 (very true). The measure has shown good internal consistency, construct, concurrent, and discriminant validity (McAuley et al., 1989). The interest and enjoyment subscale shown good internal consistency, with a Cronbach's alpha values ranging from .62 to .85 (Amorose & Horn, 2000; McAuley et al., 1989; Williams & Gill, 1995). This study found the Cronbach's alpha exceeded .94 for this measure.

5.2.3.2 Basic Psychological Needs. The Basic Psychological Needs Satisfaction and Frustration Scale (BPNSFS) contains 24 items, and the domain-specific training version was adapted for use in this experimental study (Aelterman et al., 2016). The measure assesses BPN satisfaction and frustration for autonomy, competence, and relatedness (Aelterman et al., 2016; Chen et al., 2015). The scale uses a 5-point Likert scale, ranging from 1 (not at all true) to 5 (totally true). The measure has shown good internal consistency with composite values exceeding .81 and .71 for each satisfaction and frustration subscale, respectively (Chen et al., 2015). This study found the Cronbach's alphas exceeded .80 for each of the subscales with the exception of relatedness satisfaction which was .71. For the purposes of this study, responses were scored to obtain satisfaction for autonomy, competence, and relatedness.

5.2.3.3 Team Identification. The Multi-Component Ingroup Identification Scale (MIIS) is a two-dimensional model containing two general factors of self-definition and self-investment, which contain five factors between them that reflect different aspects of the ingroup identification process (Leach et al., 2008). As previously outlined, the self-investment factor was the primary focus because it is more closely associated with identification than the self-definition factor (Postmes et al., 2013). The measure shows good internal consistency, construct, concurrent, and discriminant validity (de Souza et al., 2019; La Barbera & Capone, 2016; Lovakov et al., 2015). This study found the Cronbach's alphas exceeded .77 for each of the subscales.

5.3 Data Analysis

The study adopted a 2 (team identification: high vs. low) x 2 (competence: high vs. low) between-participant experimental design. A two-way mixed ANOVA was used to determine the

impact of the trial on response time on the complex reaction time task dependent on the experimental group. The two-way mixed ANOVA was conducted using the R package rstatix version 0.7.2 (Alboukadel, 2023). Prior to conducting this analysis the data were checked to confirm that the assumptions for carrying out a two-way mixed ANOVA were met. The two-way mixed ANOVA was followed by planned one-way ANOVAs and Bonferroni corrected pairwise comparisons to identify differences between and within groups. These additional tests were only conducted when significant interactions and main effects were detected.

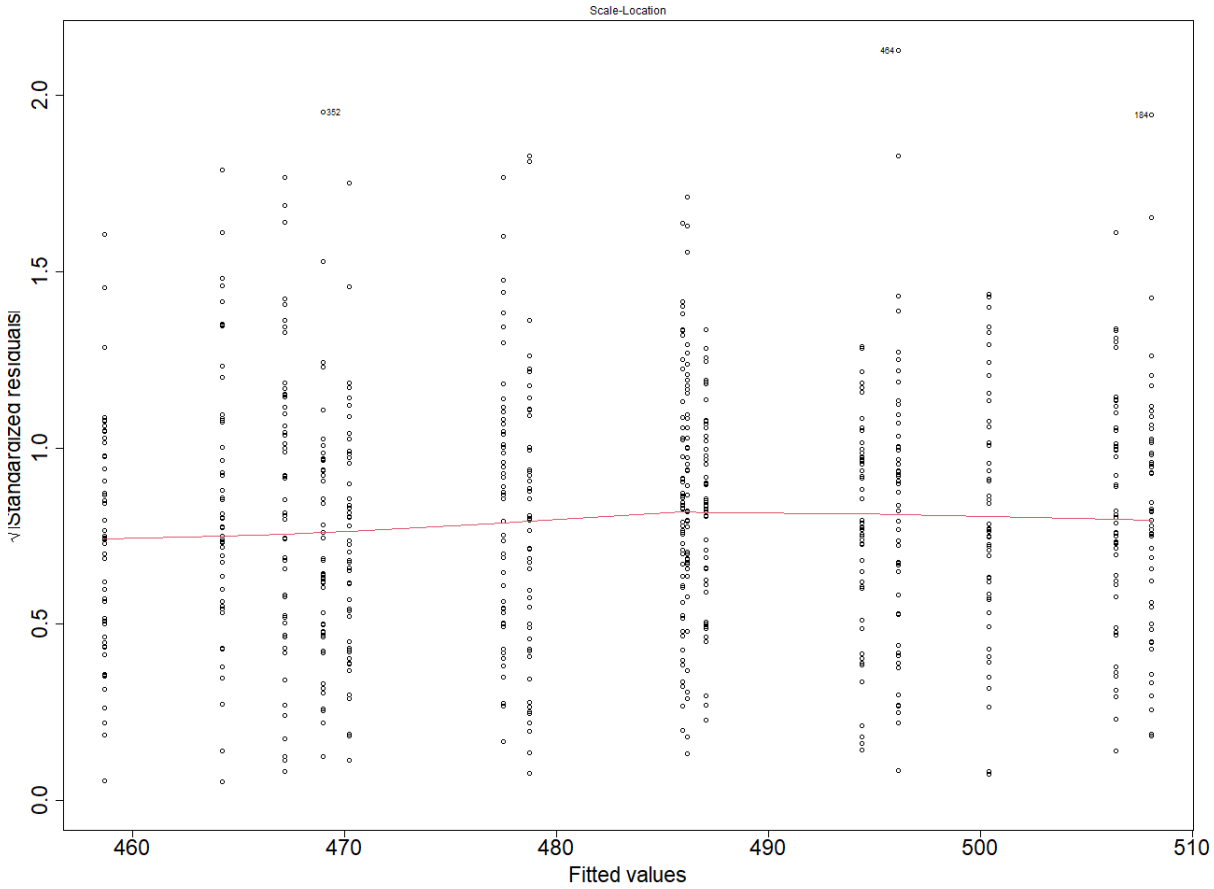
Finally, the measures completed by participants at the end of the experiment were analysed to determine which experimental groups had the highest scores on measures of BPN, team identification, and intrinsic motivation. This was achieved by conducting one-way ANOVAs to compare the differences in scores on each of the measures between the experimental groups. Before conducting one-way ANOVAs, the assumptions for conducting this analysis method were checked. The assumption of normality was not checked based on the large sample size for each experimental group. Checks of homogeneity of variance were violated for relatedness, centrality, and solidarity. Due to the sensitivity of ANOVA to even minor violations of homogeneity of variance nonparametric Welch-ANOVA and Games-Howell post-hoc tests were performed.

All participants correctly responded to the corresponding attention check questions and were included in the analysis. As previously stated, a two-way mixed ANOVA was performed and prior to conducting this analysis, the relevant assumptions were checked to determine whether any violations were committed. There were a number of outliers but the decision was taken not to remove these from the analysis. Recent studies have suggested that removing outliers in reaction time tasks can cause more harm than good (Miller, 2023; Vankov, 2023). There might have also been legitimate reasons for participants responding slowly, such as a lack of interest in the task, which could be linked to one of the experimental conditions.

The equality of variances assumption was checked visually and then confirmed by Levene's test. Figure 12 showed the spread of the residuals was constant based on the relative flatness of the horizontal line, which indicated equality of variance assumption being satisfied. The nonsignificant Levene's test result further confirmed this, $F(14, 735) = 0.84$, $p = .63$. A test of normality was not required because the sample size was adequately large in size for conducting a two-way mixed ANOVA, exceeding the recommendation of greater the 30 participants in each group (Sawyer, 2009). Lastly, the sphericity assumption was checked because of the repeated-measures design of

Figure 12

Comparison of the dispersion of variances



the study. Mauchly's test indicated that the assumption of sphericity had been violated for the main effect of trial number, $\chi^2(2) = 36.73$, $p < .01$ (see Appendix H for two-way mixed ANOVA and post-hoc test outputs). To account for the violation, the Huynh-Feldt correction was selected because the epsilon value was closer to 1 than the lower limit of 0.25 (Field, 2009; Huynh & Feldt, 1976).

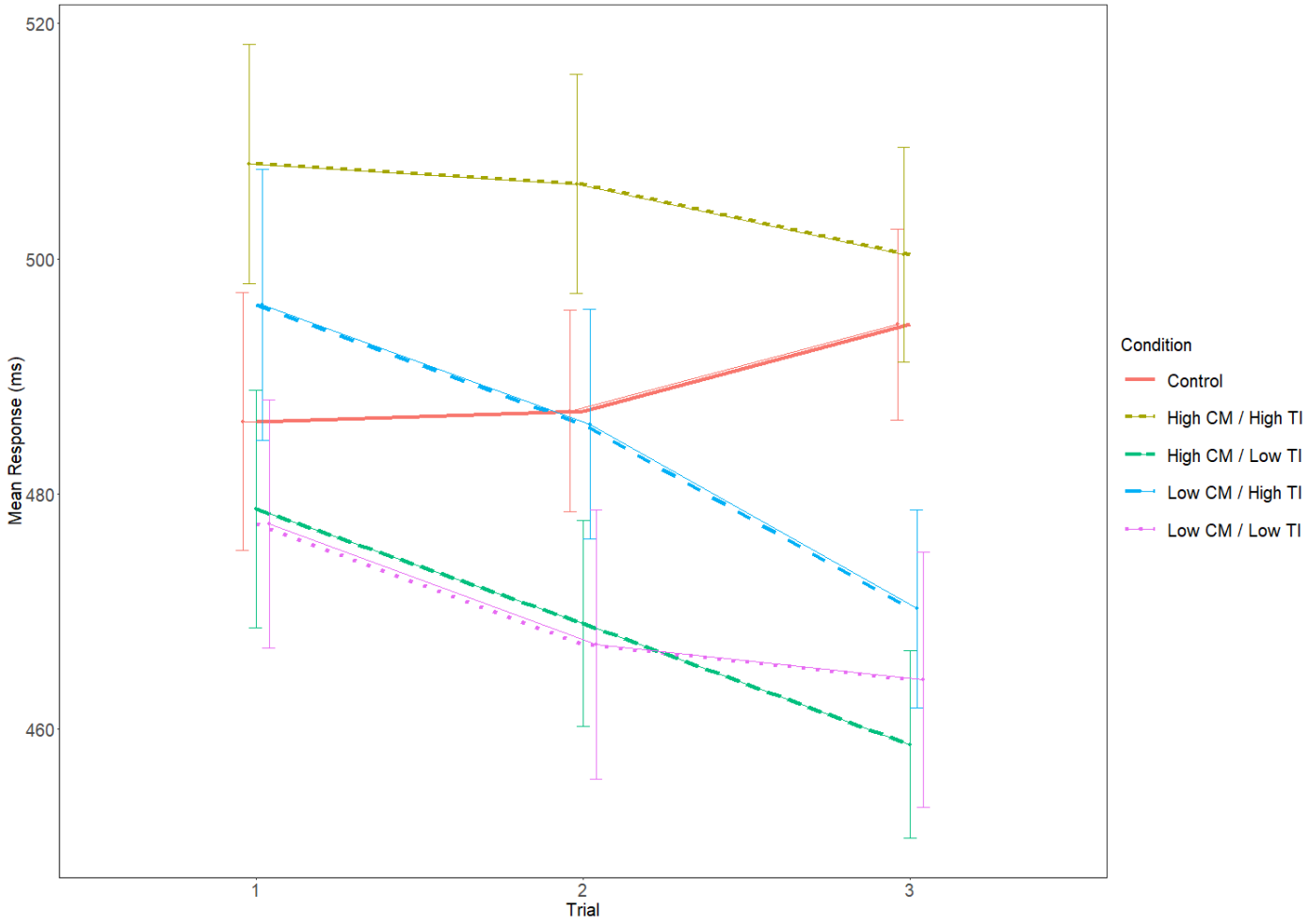
5.4 Results

All effects were reported as significant at $p < .05$. There was a significant main effect of experimental condition on the reaction time of participants, $F(4, 245) = 2.74$, $p = .03$. This effect indicated that by ignoring the trial number being attempted, reaction times on the task differed by experimental condition. There was also a significant main effect of trial number on the average reaction time of participants, $F(1.66, 406.68) = 8.49$, $p < .01$. This effect indicated that by ignoring the experimental condition, reaction times decreased from the first to the third trial. There was a significant interaction between the trial number being attempted by participants and the experimental condition, $F(6.64, 406.68) = 2.27$, $p = .03$ (see Figure 13). This indicated that

the experimental condition had an effect on reaction times dependent on the trial being completed by participants. To break down this interaction, simple main effects analysis were performed to determine the main effects of the experimental group and trial on reaction time.

Figure 13

Mean reaction times by experimental group for each trial



Note. CM = Competence, TI = Team identification.

Results of the simple main effects of the experimental group were significant for trial three of choice reaction task $F(2, 245) = 4.35$, $p < .01$. At trial three, pairwise comparisons revealed that reaction times were significantly slower in the High CM-High TI group (500.37 ± 64.49 ms) compared with the High CM-Low TI (458.68 ± 56.23 ms, $p < .01$, $d = .49$) and the Low CM-Low TI groups (464.20 ± 76.71 ms, $p = .05$, $d = .38$). Results of the simple main effect revealed a significant effect of trial on reactions times for the High CM-Low TI group ($F(2.00, 98.00) = 8.23$, $p < .01$) and Low CM-High TI groups ($F(1.50, 73.64) = 5.99$, $p = .04$). The pairwise comparisons revealed that reactions times for the High CM-Low TI group were significantly slower for trial one (478.72 ± 71.50 ms, $p < .01$, $d = .54$) compared with trial three (458.68 ± 56.23 ms). Additionally,

the pairwise comparisons revealed that reactions times for Low CM-High TI group were significantly slower for trial one (496.09 ± 81.55 ms, $p = .01$, $d = .42$) and trial two (485.93 ± 69.12 ms, $p < .01$, $d = .45$) compared with trial three (470.22 ± 59.42 ms).

One-way ANOVAs were performed to determine whether differences existed between the experimental groups and reported levels on each subscale. Descriptive statistics and correlations among the measured subscales are presented in Table 16. On average, competence and satisfaction were the highest scored subscales from their respective measures. Participants also reported a relatively high degree of enjoyment and interest. The correlation between solidarity and satisfaction at .81 was relatively high and might have been an indication of item redundancy. However, the different correlations observed between these two factors and the remaining factors, such as the relatedness component, supported the decision to keep both for the final analysis.

Table 16

Means, standard deviations, and correlations for each of the subscales

	Subscale	Mean	SD	1	2	3	4	5	6
1	Autonomy	2.91	0.90						
2	Competence	3.74	0.85	.28*					
3	Relatedness	2.37	0.72	.52*	.17*				
4	Centrality	1.87	1.32	.33*	.05	.53*			
5	Satisfaction	3.33	1.52	.33*	.36*	.52*	.59*		
6	Solidarity	2.68	1.43	.41*	.26*	.66*	.69*	.81*	
7	Enjoyment	4.51	1.43	.49*	.32*	.36*	.35*	.50*	.49*

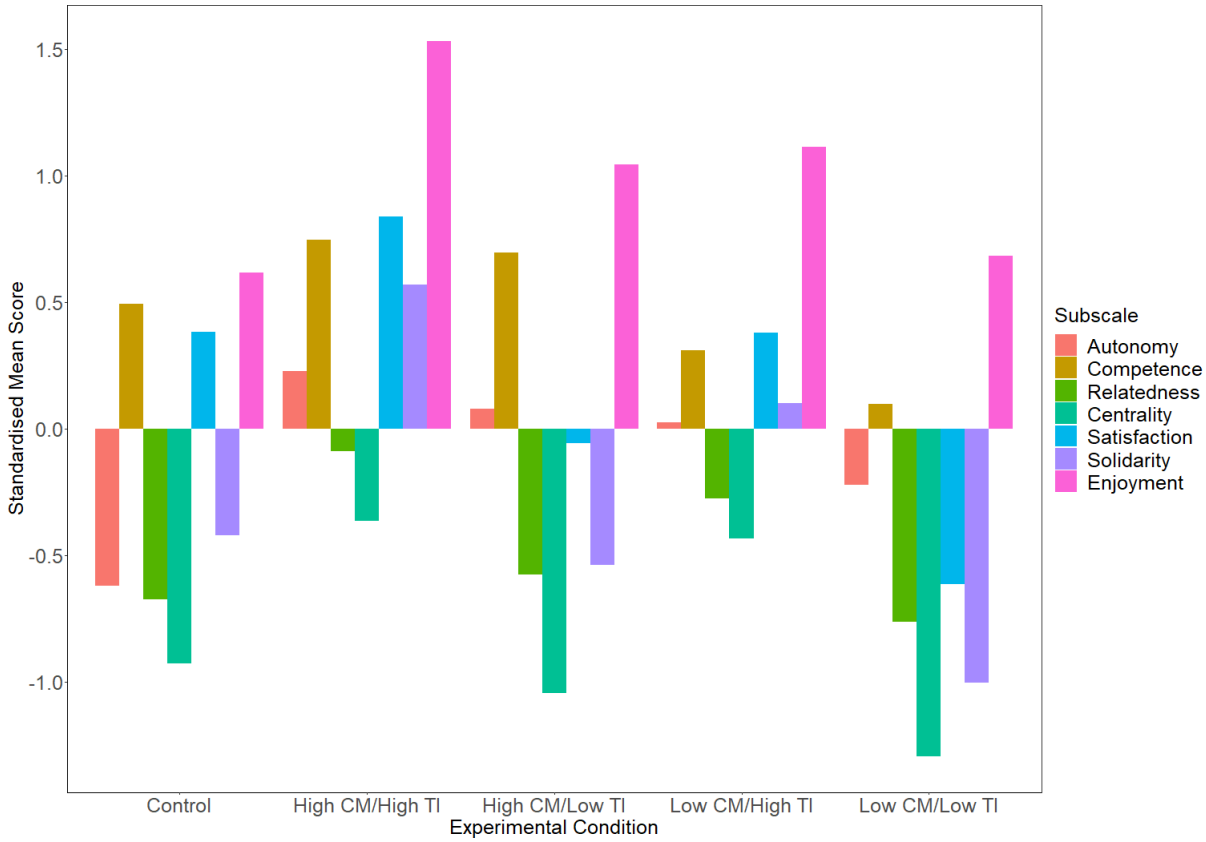
Note. * $p < .05$

Figure 14 shows the standardised means scores for each experimental group on the individual subscales from the BPNSFS, MIIS, and IMI. The mean scores and standard deviations for each subscale are presented in Table 17. On average, participants in the High CM-High TI group reported higher scores on each subscale. In contrast, participants in the Low CM-Low TI group were, on average, the lowest scoring across each of the subscales, with the exception of autonomy and enjoyment. The standardised scores for the factors of relatedness and centrality considerably lower in comparison to the remaining factors for each of the experimental groups.

Each one-way ANOVA found a significant difference between the experimental groups and scores on each subscale (see Appendix I for raw outputs). Ad-hoc pairwise comparisons found a

Figure 14

Standardised mean scores for subscales by experimental group



Note. CM = Competence, TI = Team identification.

number of significant differences.

Participants in the High CM-High TI group (4.15 ± 0.66) and High CM-Low TI (4.07 ± 0.72) groups scored significantly higher for competence than the low support for competence groups. Notably, participants did not score significantly higher on support for competence than those in the control group.

Pairwise comparisons revealed that participants in the High CM-High TI and Low CM-High TI groups reported significantly higher scores for centrality, satisfaction, and solidarity when compared against scores from the two low team identification groups. However, solidarity was the only subscale where scores for either High CM-High TI (3.89 ± 1.24, $p < .01$) or Low CM-High TI groups (3.21 ± ± 1.58, $p = .04$) were significantly higher than the control group (2.45 ± 1.04). Scores on the centrality subscale were also significantly higher for participants in the High CM-High TI group (2.53 ± 1.43, $p = .01$) compared with the control group (1.71 ± 1.05). Those in the control group were also observed to report significantly higher scores on centrality (1.71 ± 1.05, $p = .01$), satisfaction (3.62 ± 1.28, $p < .01$), and solidarity (2.45 ± 1.04, $p < .01$) than those in the

Table 17

Subscale mean scores and standard deviations for outcome measures

	1		2		3		4		5		
	Control		High CM-High TI		High CM-Low TI		Low CM-High TI		Low CM-Low TI		Pairwise comparisons
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Autonomy	2.16	0.84	3.39	0.79	3.18	0.69	3.10	0.83	2.74	0.80	2, 3, 4, 5 > 1; 2, 3 > 5
Competence	3.78	0.99	4.15	0.66	4.07	0.72	3.51	0.73	3.20	0.74	1 > 5; 2, 3 > 4, 5
Relatedness	2.08	0.46	2.93	0.77	2.22	0.71	2.66	0.73	1.95	0.34	2, 4 > 1, 3, 5;
Centrality	1.71	1.05	2.53	1.43	1.54	1.04	2.43	1.73	1.17	0.42	1 > 5; 4 > 3, 5; 2 > 1, 3, 5
Satisfaction	3.62	1.28	4.28	1.26	2.98	1.41	3.61	1.61	2.17	1.18	1 > 5; 2 > 3, 5; 3 > 5; 4 > 5
Solidarity	2.45	1.04	3.89	1.24	2.27	1.16	3.21	1.58	1.60	0.83	1 > 5; 2, 4 > 1, 3, 5;
Enjoyment	3.96	1.39	5.29	1.22	4.58	1.35	4.68	1.53	4.05	1.26	2 > 1, 5
Errors	2.14	1.81	3.82	2.36	2.60	2.00	3.62	2.09	2.92	2.09	2 > 1, 5

Note. CM = Competence, TI = Team identification.

Low CM-Low TI group.

As previously noted, on average, relatedness and centrality were the two lowest-scored subscales across the entire sample. The one-way ANOVA for relatedness was observed to be significant ($F(4, 118.90) = 23.19$, $p < .01$), and the pairwise comparison showed a similar pattern to the three self-investment components in terms of significant differences between the experimental groups.

Autonomy was found to be significantly different across the groups ($F(4, 122.33) = 17.36$, $p < .01$). Each experimental group was found to score significantly higher than the control group and this was the only subscale where this was observed. The High CM-High TI (3.39 ± 0.79, $p < .01$) and High CM-Low TI (3.18 ± 0.69, $p = .03$) groups were also observed to have significantly higher reported scores than the Low CM-Low TI group (2.74 ± 0.80).

The enjoyment and interest subscale, on average, received the highest reported scores for each of the groups (4.51 ± 1.43). Consequently, only the High CM-High TI group (5.29 ± 1.22) was observed to have significantly higher reported scores than the Low CM-Low TI (4.05 ± 1.26, $p <$

.01) and control groups (3.96 ± 1.39, $p < .01$).

The number of errors committed by participants was also found to be significantly different ($F(4, 122.27) = 5.77$, $p < .01$). On average, the High CM-High TI group committed significantly more errors (3.82 ± 2.36) than the control group, which committed the fewest errors (2.41 ± 1.81), and the Low CM-Low TI group (2.92 ± 2.09).

5.5 General Discussion

The study examined the potential impact of priming effects on performance in a choice reaction task, specifically targeted at competence satisfaction and team identification. The results tentatively supported the first two research questions, that a competence-supportive environment (H1) and enhancing the salience of a meaningful team identity (H2) would improve reaction times. However, the final research question was only partially supported regarding the combined priming effects of competence and social identification (H3). Moreover, this chapter contributed to the general aims of the thesis by contributing towards a better understanding of the combined effects of support for BPN and social identification, and more broadly, attending to the exploration of the relationship between key concepts from each framework.

5.5.1 Reaction Times

The study results showed that reaction times significantly improved from the first to the last trial when a competence-supportive environment or a meaningful team identity was primed. However, when the priming effects were combined for a single group, reaction times did not improve compared to other experimental groups or over the course of the three trials. However, this group did experience substantial changes as a consequence of the combined priming effects. These findings will be discussed further in this section.

Reaction times significantly improved from trial one to trial three for participants in the High CM-Low TI and Low CM-High TI groups. The medium effect size suggested that the differences were meaningfully large. The remaining groups did not show significant changes in reaction times, albeit the High CM-High TI and Low CM-Low TI groups times did decrease while the control group increased. Additionally, the reaction times at trial three were also found to be significantly faster for the High CM-Low TI and Low CM-Low TI groups compared with the High CM-High TI group, with small to moderate effect sizes.

5.5.2 Experimental Groups

Findings from the High CM-Low TI group were in line with past research that showed competence satisfaction was associated with improved performance (e.g., Cerasoli et al., 2016; Fransen, Vansteenkiste, et al., 2018). The High CM-Low TI participants also scored significantly higher in competence satisfaction than groups that did not receive the priming for competence support. Findings from the Low CM-High TI group were consistent with previous studies that showed that performance improved in groups when a meaningful social identity was made salient (e.g., Fransen et al., 2015; Greenaway, Cruwys, et al., 2015). Participants in the Low CM-High TI group experienced higher social identification, with significant increases in centrality, satisfaction, and solidarity compared with the low identification groups.

Satisfaction (self-investment) was consistently found to be higher than the solidarity and centrality factors. Considering the limited information given to participants, the short duration of the experiment, and the lack of contact with other group members, the observed low scores for the centrality factor were not surprising. Research that has examined self-investment in the context of an online community (i.e., Reddit) found centrality to be lower than satisfaction and solidarity (Howard & Magee, 2013). Additionally, higher scores for satisfaction and solidarity were likely to have indicated an individual's emotional investment in the group, which helped foster their degree of social identification (Leach et al., 2008; Tajfel, 1978).

5.5.3 Combined Priming Effect

The High CM-High TI group was expected to produce a higher level of performance to the High CM-Low TI and Low CM-High TI groups, with reaction times improving from trial one to trial three. Instead, reaction times were, on average, slower for each trial, and while they showed a marginal improvement, the gap widened significantly for trials two and three compared with the Low CM-Low TI group. Thus, the combined priming effects of competence support and team identity appeared to hinder rather than boost performance. This result was unexpected, especially when compared with previous research that showed performance was boosted when competence-supportive feedback was received from two social agents (Fransen, Boen, et al., 2018). The reasons for the unexpected result are detailed below.

First, the overall performance of the High CM-High TI group members appeared to be worse than the remaining groups in terms of average time to respond and the number of errors committed. It is possible that the group collectively aimed to maintain their performance instead of

pushing to improve their performance based on the competence-supportive feedback that:

> "If you keep up this level, you will increase the likelihood of your group achieving the desired performance for Cancer Research UK to receive the bonus payment."

This would have reflected similar findings where productivity was found to be lower where a social identity had been made salient (Diehl & Stroebe, 1987; Nijstad et al., 2006). Similarly, the High CM-High TI group might also have chosen to redefine what was considered a 'good' or 'good enough' performance based on the competence-supportive feedback (Haslam et al., 2004). Yet, it is difficult to determine if these explanations are a fair reflection of group members' experiences during the experiment.

Second, participants in the High CM-High TI group had the highest subscale scores on each measure, indicating that both conditions were manipulated successfully. As expected, the difference in competence satisfaction was nonsignificant when comparing the High CM-High TI and High CM-Low TI groups. Similarly, the difference in self-investment subscales was also nonsignificant compared with the Low CM-High TI group. Yet, in both instances, the participant's scores in the High CM-High TI group were higher and, more importantly, this group was seemingly much more affected by each of the manipulations. Consequently, the High CM-High TI group's performance remained relatively unchanged while also committing significantly more errors than the Low CM-Low TI and control groups. This might have been evidence of additional pressure to succeed being experienced from the combined priming effects for competence and team identity, which was absent in the High CM-Low TI and Low CM-High TI groups.

In line with past research, pressure from social agents has been associated with increased amotivation and reduced enjoyment (Sánchez-Miguel et al., 2013). Research on choice reaction task has shown that distractions and external stressors were associated with poorer cognitive performance and evidenced in terms of longer reaction times and errors (e.g., Damaso et al., 2022; Muley et al., 2016; Shinde et al., 2014). Additionally, if the feedback was not perceived as competence-supportive by the High CM-High TI group, it is feasible that it might have inadvertently thwarted competence instead. Past research has demonstrated the negative effects that thwarting competence can have on performance (Fransen, Vansteenkiste, et al., 2018). Yet, participants in this group had the highest reported scores for enjoyment and interest, suggesting that thwarting of competence was not occurring.

Additionally, the performance of the High CM-High TI group was significantly slower than

the Low CM-Low TI group for two of the three trials. The reaction times for participants in the Low CM-Low TI group decreased with each trial, albeit the difference was not observed to be significant. This was reflected in the scores plateauing between trials two and three. Yet, the reaction times for Low CM-Low TI group significantly improved compared with the High CM-High TI group members for trials two and three. As previously mentioned, there was also a significantly higher number of errors committed by members of the High CM-High TI group compared with the Low CM-Low TI group. Thus, the Low CM-Low TI group appeared less affected by the priming effects and offered indirect evidence of the external pressure experienced by the High CM-High TI group.

Third, the low autonomy score for the High CM-High TI group was unexpected, although this was higher than all other groups. Considering that participants, as members of the Prolific crowdsourcing platform, have the freedom to choose the research they participate in autonomy was generally expected to be scored more highly across each group. One possible explanation is that although feedback supported competence satisfaction, as indicated by subscale scores, the feedback to 'maintain' or 'enhance' performance may have undermined autonomy by adversely impacting the sense of volition associated with completing the task (Cuevas-Campos et al., 2020; Olafsen et al., 2017; Ryan & Deci, 2000b). Access to data on regulatory forms of motivation would be necessary to determine whether participants' behaviour was experienced as controlling due to the feedback. Nonetheless, the high level of enjoyment and interest within the High CM-High TI group provided some evidence that the behaviour might not have been entirely perceived as controlled.

Fourth, the higher scores on each subscale for the High CM-High TI group might have been linked to the facilitative effects of particular factors being primed. In past research BPN satisfaction has been used to mediate the relationship between social identification and various outcomes (e.g., well-being), and vice versa (e.g., Amiot et al., 2010; Greenaway, Cruwys, et al., 2015; Greenaway et al., 2017). Thus, the higher scores observed for the High CM-High TI group might be because of an interplay between the main factors of BPN and self-investment. Past research has shown how BPN and task engagement can have a mutually reinforcing effect on each other (Curran et al., 2016; Jang et al., 2016; Reeve & Lee, 2014). Although these effects were found over long periods of time, the effects would likely have been cumulative and might have been observed within the confinement of this choice reaction task. Additionally, the subscale correlations (see Table 16) suggested that relatedness had a moderate to strong association with each

self-investment factor, whereas competence and autonomy showed very weak to weak associations. Notably, the correlations observed between the three BPN were found to be weakly associated with the exception of relatedness and autonomy, which was a moderate association. While there does appear to be an interplay between the main factors, the bivariate correlations do not provide sufficient evidence to support the possibility of mutual reinforcement.

5.5.4 Low Competence and Team Identification Priming

As previously mentioned, in two out of three trials, the Low CM-Low TI group significantly outperformed the High CM-High TI group. The Low CM-Low TI were expected to be the worst-performing group, but this was not the case. There are two possible explanations. First, the low social identity group received the same instructions as the group that attempted to prime a more meaningful and emotionally important social identity. The difference was in the charity each team competed for to receive a bonus. The priming effect might have had the unintentional effect of boosting performance. However, the manipulation checks suggest that this group experienced significantly less social identification than most of the groups.

Second, the significantly faster reaction times might have been a consequence of participants adopting a strategy for improving their social status (Tajfel, 1974). The low status of the Low CM-Low TI group, implied by competing for an unfamiliar charity, might have contributed to the group's faster reaction times due to social competition. The intergroup competition element was made clear to all participants, while the charities that each team were supporting were kept secret. Therefore, participants were unlikely to have adopted a social creativity strategy because the only group-defining characteristic was kept secret. Social mobility might have been possible if participants had information on the permeability of the outgroup. Thus, social competition was the only viable strategy for the Low CM-Low TI group members to improve their social status and might have contributed to their overall performance on the choice reaction task (Ouwerkerk et al., 2000). This is broadly in line with previous research that examined the strategies available to group members to improve or maintain their social status (Platow et al., 2014; Tarrant & Butler, 2011).

5.5.5 Relatedness and Self-Investment

Satisfaction of relatedness was found to be significantly higher in the High CM-High TI and Low CM-High TI groups compared with the groups that received the low salience social identity priming effects. The relatedness and self-investment factors were not used directly in the analysis but as manipulation checks, with the exception of the correlation analysis. However, there

were some noteworthy observations. While relatedness was not directly primed during the experiment, on average, the observed scores tended to follow a similar trend as the centrality subscale. However, in each case, the standardised score was higher for relatedness for each group. Yet, it was also found to be lower than satisfaction and solidarity subscales for each group, with the exception of the Low CM-Low TI group. Thus, as suggested in Chapter 3, the relationship between relatedness and the self-investment factors has been found to be closer than for autonomy and competence. Furthermore, while the scores of relatedness and the self-investment factors follow a similar trend there does appear to be a degree of independence. Again, this might indicate relatedness tapping into slightly different features of group life, such as interpersonal relations and the self-investment factors help to bridge the gap to understanding larger group dynamics (Martela et al., 2021). Additionally, the enjoyment and interest factor, a proxy of intrinsic motivation, was found to be strongly correlated to competence, satisfaction (self-investment) and solidarity. Relatedness was only found to be moderately correlated with this intrinsic motivation factor. This finding is supported by a unified approach study that found greater social identity was associated with greater intrinsic motivation and relatedness satisfaction, albeit that it was substantially lower than competence and autonomy (Neys et al., 2014). Thus, the observed trends provided support to the notion that relatedness and self-investment factors were independent of each other but connected in terms of assessing different aspects of group processes.

5.5.6 Control Group

Members of the control group showed a deterioration in their reaction time scores across each trial, which conflicted with the suggested explanation for the performance of the Low CM-Low TI group, that a lower degree of social identification and competence support accounted for the differences between the High CM-High TI and Low CM-Low TI groups. Additionally, participants in the control group experienced high degrees of competence and satisfaction (self-investment). A possible explanation for this outcome was related to the level of social self-category participants used to define themselves.

The prolific platform has an active community of research participants. When these individuals were not explicitly assigned to a group, it was possible that the more abstract self-category as a Prolific group member became most salient (Turner et al., 1987). Thus, as members of the Profilic ingroup, participants might have strived to achieve normative outcomes in terms of producing high-quality submissions. This notion was supported by the number of errors

committed by the control group being the fewest of any experimental group. The subscale scores for the self-investment factors of satisfaction and solidarity were also found to be significantly higher than the Low CM-Low TI group. Additionally, the observed deterioration in reaction time from the first to last trial might also reflect wanting to 'do a good job' on behalf of the community. This is in line with past research that has shown the different outcomes associated with changes in the levels of abstraction that determine the salience of a social identity (e.g., Campo et al., 2018). More importantly, the control group were not exposed to any priming effects and would have been expected to participate in the task as individuals. However, it has previously been argued that most situations are likely to be affected to some degree by social identity processes (e.g., Haslam, 2004), which suggests why their Prolific identity might become salient.

Participants in the Low CM-Low TI and control groups had the lowest combined average scores for autonomy and competence. Satisfaction of autonomy and competence are important in facilitating intrinsic motivation (e.g., Berntsen et al., 2019; Mossman et al., 2022). Thus, unsurprisingly, both groups also had the lowest scores for the interest and enjoyment subscale. Conversely, the High CM-High TI group had the highest combined autonomy and competence score and, subsequently, a significantly higher score for enjoyment than either the Low CM-Low TI or control groups. Thus, these findings provide support to a main tenet of SDT that the three BPN are interdependent and autonomy and competence are necessary for facilitating intrinsic motivation (Deci & Ryan, 2000).

Scores for autonomy were lower than expected for participants across each group. While the experimental design chose to prime support for competence rather than autonomy and relatedness, participation was voluntary. Moreover, the sample of participants were all from the crowd-sourcing platform Prolific, which meant that on top of being voluntary, anyone who took part received a pro-rated payment equivalent to £6 per hour. Previous research showed that incentives can have a detrimental effect on autonomy, competence, and performance when the criteria for receiving an incentive was explicit to participants (Cerasoli et al., 2016). Thus, autonomy might have been impacted, and because the experiment did not attempt to create an autonomy-supportive environment, scores for this variable remained low. Furthermore, had performance been affected in the same way, this would have impacted all groups, albeit it is not possible to quantify if the effects were similar across groups. Findings from reaction time studies have indicated that rewards have not adversely affected performance when they have been

presented prior to the start of a reaction time task (e.g., Failing & Theeuwes, 2017).

5.5.7 Strengths and Limitations

This experimental study represented the first attempt to explicitly adopt a unified approach for the purpose of studying the effects of priming BPN and social identification in a combined way. Evidence supporting the individual effects of priming BPN and social identification were also examined alongside the combined effects. The effects from combining the priming of BPN and social identification warrants further investigation to better understand the interaction observed in this study and also to determine whether the same effects were present in more complex tasks similar to the activity used in Fransen and colleagues (2015).

As with Study 1, the findings from this study have provided further support for measuring BPN as separate constructs rather than a unitary construct. There were clear differences in the reported levels of BPN. Moreover, this study went further than Study 1 by including a proxy measure of motivation and was a useful additional that helped to contextualise some of the results. However, this measure of motivation was limited in being able to distinguish meaningful differences across each of the experimental groups. Therefore, measuring the full array of regulatory forms of motivation would be a crucial next step to building on the findings from the first two studies.

Furthermore, while the study provided evidence for the link between the SIA, SDT, and group performance, there are limitations and avenues for further exploration. The decision to collect self-report measures solely post-experiment, although pragmatic in reducing participant burden and limiting financial costs, necessitates cautious interpretation of the findings. While it may be improbable that the results were achieved by chance, it remains impossible to definitively exclude the possibility that the manipulation check findings were coincidental. Future research should adopt a similar approach but include pre- and post-experiment measures. To mitigate participant burden, the number of items collected could be reduced.

Participation in this study was limited exclusively by age. However, due to the relatively small differences in average response times between groups, it is possible that underlying medical issues associated with cognitive impairments could have directly impacted the results (e.g., Deary et al., 2011). Although the confidence intervals for group reaction times were broadly similar in size, future studies should carefully consider underlying medical issues as an exclusion criterion.

The unexpectedly low autonomy scores across all groups could be attributed to the experimental design or the impact of incentives, which merit further investigation. Additionally, the

control group dynamics with its possible Prolific community identity and the Low CM-Low TI group's social competition strategy highlighted the complexity in attempting to examine group processes, even in the absence of deliberate manipulation. This study also offered further evidence towards understanding the possible relationship between relatedness and social identification. These findings warrant a deeper analysis of how different forms of social identification can influence motivational and group processes.

5.5.8 Summary

This study explored the impact of competence-supportive environments and social identity on choice reaction tasks. Generally, the results from this study supported the notion that changes to either social identification and BPN can influence performance. Unexpectedly, the group with both a combined priming effect for social identity and competence support (i.e., High CM-High TI) had the slowest reaction times and committed the highest number of errors. This suggested that the combined effect might have unintentionally created external pressures that hindered performance. Several explanations were given for this finding, such as additional pressure to succeed that other groups did not experience. Conversely, the relatively faster reaction times in the low-competence, low-identity group (i.e., Low CM-Low TI) might be attributed to social competition, where enhancing ingroup status became the primary motivator.

Chapter 5 introduces the regulatory forms of motivation as an additional set of factors with BPN and social identification in the context of amateur football. Health outcomes are also considered in the form of athlete burnout and physical health. Moreover, the relationship between the various factors were considered longitudinally to examine the stability of latent profiles and their membership.

6 CHANGES IN MOTIVATION, NEED SATISFACTION, AND SOCIAL IDENTIFICATION DURING A FOOTBALL SEASON

6.1 Introduction

In the previous chapter, the influence of competence-supportive environments and social identification were examined in the context of a choice reaction task performance. The findings provide a unique insight into the possible effects of priming competence-support and team identification. However, additional research is required to validate the findings from Chapter 2 due to the absence of baseline measures.

Chapter 6 examines the role of social identification, basic psychological needs (BPN), and the regulatory types of motivation from self-determination theory (SDT). The inclusion of regulatory forms deals with a limitation from the previous two studies in this thesis, with the aim of adding further contextual information in differentiating latent profiles. Additionally, the context shifts from being entirely cross-sectional to introducing a longitudinal element to the unified approach. In doing so, this chapter aims to provide evidence towards the broad aims of the thesis in terms of adding to the evidence in support of a unified approach, in the context of a performance-based setting and longitudinal design.

The domain of physical activity has garnered significant attention from researchers working in the fields of the social identity approach (SIA) and SDT. As previously discussed, autonomous forms of motivation and satisfaction of BPN are typically associated with positive outcomes such as improved well-being in the context of sport and exercise (e.g., Ntoumanis et al., 2021; Teixeira et al., 2012). Similarly, the quality and strength of social identification with a group or groups have been found to foster improved well-being outcomes (e.g., Hunt et al., 2020; Murray et al., 2023). These findings reflect variable-centred research, where key findings are aggregated to represent the wider population from which a sample has been taken (Cece et al., 2018). However, the person-centred literature provides a more nuanced perspective of motivation and group processes. The next sections review the person-centred literature in relation to the SIA and SDT frameworks.

6.1.1 Motivation and Latent Profiles

Studies have tended to focus solely on the regulatory types of motivation over and above BPN in the context of performance-based settings (e.g., Lawler et al., 2017; Lohbeck et al., 2022; Shannon et al., 2021; Turner et al., 2022). Even fewer examples exist that have combined the full

range of BPN and regulatory forms (e.g., Cece et al., 2018). A study by Gustafsson and colleagues (2018) examined regulatory types of motivation and the subsequent relationship to burnout in elite athletes. The research identified five unique motivational profiles: amotivation, low motivation, moderately autonomous motivation, amotivated and moderately controlled motivation, and highly motivated. The main finding was those subgroups characterised by more controlled forms of regulation and amotivation were more likely to report higher levels of burnout. A finding that the author's state confirms a main SDT proposition that amotivation and controlled motivation lead to adverse outcomes (Ryan & Deci, 2000b). This finding has been further supported by other empirical research (Chu et al., 2018; Turner et al., 2022). Conversely, evidence has been found for the opposite effect where more autonomous forms of motivation are associated with positive outcomes, such as improved performance or well-being (Gillet, Berjot, et al., 2012; Lohbeck et al., 2022; Wang et al., 2016). Additionally, the highly motivated subgroup, characterised by high levels of autonomous and controlled forms of motivation, was unexpectedly found to help reduce experiences of burnout (Gustafsson, Carlin, et al., 2018). The high levels of autonomous motivation were suggested to protect against the adverse effects of higher levels of controlled forms of regulation.

The findings discussed thus far have all adopted a cross-sectional design. Latent transition analysis (LTA) is an extension of latent profile analysis (LPA) and provides an opportunity to study changes in, for example, levels of motivation, the stability and variability of motivational profiles, and tracking developmental changes across time (Xie et al., 2022). While there has been a recent growth in the use of this approach, there remain limited examples related to the SIA and SDT both more generally and more specifically in the context of performance (e.g., sport, exercise, academia, and work).

Across a range of studies, motivational profiles have been found to remain consistent in terms of their distribution of mean scores (e.g., Cece et al., 2018; Gillet et al., 2017; Martinent & Decret, 2015; Oga-Baldwin & Fryer, 2018; Xie et al., 2021) and over long periods of time (e.g., Oga-Baldwin & Fryer, 2018; Xie et al., 2021). Such findings give support to previous cross-sectional studies in terms of the enduring nature of identified latent profiles, especially given the similarity of, for example, motivational profiles across the breadth of the person-centred literature (Gillet et al., 2009; Martinent & Decret, 2015; Vlachopoulos et al., 2000). For example, self-determined, moderately autonomous, controlled, and high-autonomous-controlled motivational profiles. These and other motivational profiles can be broadly categorised as adaptive and maladaptive (Deci &

Ryan, 2000). Yet, the stability of motivational profile membership can vary from study to study, although typically, subgroups do tend to be relatively stable (e.g., Gillet et al., 2017; Martinent & Decret, 2015). Stable subgroups tend to be associated with more adaptive types of motivational profiles and a greater likelihood of transitioning associated with less adaptive profiles (Cece et al., 2018; Emm-Collison et al., 2020; Gillet et al., 2017; Grasten et al., 2023; Xie et al., 2021). Moreover, when transitions occur, there is a greater tendency for membership to shift towards a more adaptive motivational profile (Cece et al., 2018; Emm-Collison et al., 2020; Gillet et al., 2017; Grasten et al., 2023; Xie et al., 2021).

6.1.2 Basic Psychological Needs and Latent Profiles

Several studies have focused solely on BPN from a person-centred perspective. For example, a study by Shannon, Prentice, and Breslin (2021) examined the effect of perceptions of athlete coaches' behaviours on athlete mental health. Whether the coaches' behaviour was perceived as need-supportive or need-controlling had profound and important implications for athlete well-being. The main finding supported a fundamental SDT tenet, where need-supportive behaviour was associated with significantly better mental health and less burnout (e.g., Deci & Ryan, 1985a; Ryan & Deci, 2017a). The reverse was found when coach behaviour was perceived to be more need-controlling.

Researchers have also examined BPN as predictors of profile membership and as an outcome variable (Wang et al., 2016). BPN were introduced as predictors to profile membership in terms of perceptions of physical education teachers' autonomy-supportive behaviour and as an outcome of reported competence satisfaction. The results demonstrated that when the teachers' behaviour was perceived as autonomy-supportive this predicted membership to the two most optimal subgroups that displayed more autonomous forms of motivation. This was in line with previous research (Hagger et al., 2005; Wang & Liu, 2007). Studies examining BPN latent profiles over time found broadly similar findings as those involving motivational profiles (Grasten et al., 2023; Martinent et al., 2021). This included the number of latent profiles, the distribution of scores, and the stability of both latent profile types and memberships across time. Typically, individuals from profiles that reflected BPN satisfaction reported better outcomes, such as improved well-being and greater engagement, and the opposite pattern when profiles were associated with autonomy and competence frustration (Grasten et al., 2023; Martinent et al., 2021). Findings from LTA studies also support this finding (e.g., Martinent & Decret, 2015; Saward et al., 2024).

Studies have also examined the predictive role of BPN in determining motivational profiles across time. A study by Cece and colleagues (2018) followed young athletes to determine the way motivational profile membership varies across a season and the influence of need satisfaction and frustration in predicting any changes. BPN measured at the beginning of the season were used to predict latent profile membership at the start, middle, and end of the season. Initially, the satisfaction of BPN predicted membership of the most self-determined profile. BPN satisfaction and frustration were not found to predict profile membership at mid-season. At the end of the season, only general need frustration and autonomy frustration were found to predict profile membership. The transient nature of BPN were hypothesised to be related to the intense pressure experienced by the elite-level athletes who were sampled for this study (Cece et al., 2018).

6.1.3 Social Identification and Latent Profiles

LPA has garnered far less attention from a social identity perspective in the context of sport and exercise. A study conducted by Gustafsson and colleagues (2018) found that when athletic identity was high, athletes were significantly less likely to be members of the high burnout profile. Membership in the high burnout profile was associated with athletes whose self-esteem was tied to their performance rather than their athletic identity. In another study, Bruner and colleagues (2020) found that an athlete's team identity was closely associated with the level of support from coaches, family, and friends. Athletes represented by the two profiles with the highest level of social support displayed the strongest identification with their team. Broadly, these findings are supported by studies conducted in other domains (Jackman et al., 2023; Manzi et al., 2023; Zhao et al., 2022). The findings from these studies share conceptual similarities with SDT. First, the significant role of social support is closely aligned with the BPN for relatedness. Second, performance-based self-esteem would reflect a more controlled form of regulation due to the behaviour being engaged in for the primary reason of removing some negative feelings.

Longitudinal research that has adopted LTA in the context of health and performance, limited to one study (Xie et al., 2022). The findings from this study were broadly in keeping with the general findings from the SDT literature. The number and shape of the latent profiles remained stable between time 1 and time 2. Profile membership remained stable for the most adaptive latent profiles and, where transitions occurred, these trended towards more adaptive profiles. Moreover, social identity, in the form of professional teacher identity, was found to reduce the experiences of burnout and increase the likelihood of transitioning to a more adaptive burnout profile over time.

6.1.4 The Unified Approach Literature

To date, there are no studies that have examined the unified approach from a person-centred perspective. More broadly, results from studies that have examined the unified approach have demonstrated four key findings. First, greater identification with a group was found to be associated with increased satisfaction of BPN (Greenaway, Cruwys, et al., 2015; Neys et al., 2014; Ntoumanis et al., 2018; Schertzinger et al., 2021). Subsequently, need satisfaction was found to: promote more autonomous forms of motivation and higher levels of persistence (Neys et al., 2014; Schertzinger et al., 2021); develop a reciprocal relationship between exercise identity and motivation (Ntoumanis et al., 2018); and mediate the relationship between social identification and depression (Greenaway, Cruwys, et al., 2015). Second, the regulatory types of introjection, identification, and intrinsic motivation have been found to positively predict changes in exercise beliefs. Similar findings have been reported in the SDT literature regarding the positive outcomes when controlled forms of motivation were experienced simultaneously as autonomous forms of motivation (e.g., Gustafsson, Martinent, et al., 2018). Third, well-being was found to improve under conditions of greater identification and experiences of more autonomous forms of motivation (Amiot & Sansfacon, 2011; Schertzinger et al., 2021; Thomas, Amiot, et al., 2017). However, conflicting evidence has suggested that group membership may be sufficient to improve well-being and motivation (Yampolsky & Amiot, 2013). Fourth, social identification has been found to mediate the relationship between BPN and well-being, cross-sectionally and longitudinally (Amiot et al., 2010; Greenaway, Cruwys, et al., 2015; Greenaway et al., 2017). However, it is important to stress that this body of evidence, while helping to progress the wider development and understanding of adopting a unified approach, is nonetheless limited in scope. Far more research is required to strengthen the general claims that have been presented in this section.

6.1.5 Burnout, Recreational Athletes and Physical Health

The literature on the outcomes of athletes experiencing burnout indicate a wide range of important outcomes for athletes. Studies have shown burnout to predict reductions in motivation (e.g., Gustafsson, Carlin, et al., 2018) and well-being (e.g., Pacewicz et al., 2023), and an increased risk of dropout from sport (Saward et al., 2024). These findings appear to generalise across athletes of different competitive levels, age groups, and types of sport (Gustafsson et al., 2017). This has significant implications for individuals participating in recreational sports, as potential burnout could adversely affect their overall health and well-being (Glandorf et al., 2023).

The Athlete Burnout Questionnaire (ABQ) represents a significant contribution as the first validated sport-specific measure for assessing athlete burnout. Its application has been extensive among athletes from different background and competition levels (e.g., Glandorf et al., 2023). However, a notable limitation persists: the ABQ was primarily developed for research and lacks established, consistently defined cut-offs, making it unsuitable for diagnosing or screening clinically significant burnout levels (DeFreese et al., 2023; Gerber et al., 2018). Researchers have also begun to broaden their focus beyond elite athletes to include recreational athletes. Initial findings suggest that this group may experience similar burnout levels to higher level athletes despite facing different stressors related to balancing sport with work, family, and other life domains (De Francisco et al., 2016; Glandorf et al., 2023; Grebner et al., 2024; Lower-Hoppe et al., 2022).

Another emerging area of research is examining the association between burnout and adverse physical health outcomes. Findings in occupational contexts have shown that burnout has been linked to increased risk for sleep disruption, frequency of respiratory illness, and somatic complaints such as fatigue, pain, and gastrointestinal issues are prevalent (e.g., Hammarström et al., 2023; Maslach & Leiter, 2016). There have also been investigations into the association between athlete burnout and physical health. In this regard, initial work has shown burnout to be associated with physical symptoms which includes sleep quality, headaches, dizziness, infection, and chest pain (e.g., Daumiller et al., 2022; Glandorf et al., 2023). However, while results have been mixed the issue of physical health has not been widely explored and it is possible the mixed evidence is more a function of a lack of work, rather than a lack of associations (Glandorf et al., 2023).

6.1.6 Summary and Rationale

There were several key findings from the literature associated with conducting LTA involving SDT and, to a lesser degree, the SIA. First, these person-centred approaches have shown promise in being able to show the different longitudinal patterns of motivation, and that profile membership typically remains stable over time. Second, latent profile transitions between waves typically favour moving from a less adaptive to a more adaptive latent profile. Yet, exceptions do exist, and much more work is necessary to understand whether contextual or methodological factors drive these exceptions. Similarly, a paucity of research involving the SIA and latent profiles in the context of performance or well-being limits the generalisability of these findings. However, work to date suggests similar findings to the SDT literature in terms of latent profile and membership stability over time.

The focus of this research was to examine the effect of social identity processes, BPN, and regulatory types whilst also considering the influence of latent profile membership on reported levels of burnout and physical health. These data formed the basis for discovering whether heterogeneity existed within the sample of recreational footballers and uncovering latent profiles that represent subgroups within the sample. Importantly, with data being collected longitudinally, this provided an opportunity to develop a greater understanding of the circumstances that lead to either latent profile membership change or stability over time. Thus, the overarching aim of Chapter 4 was to attempt to answer the nature of latent profiles over time. Specifically, the research questions for the cross-sectional aspects of Phase 1 are:

- H1: What degree of heterogeneity exists within the population of amateur footballers?
- H2: If heterogeneity exists in the population, will the identified motivational profiles reflect optimal (i.e., self-determined) and maladaptive (i.e., more controlling) functioning?

The research questions for the longitudinal aspect of Phase 2 are:

- H3: Which sport motivational profiles are the most stable across time? Which profiles are the least stable?
- H4: How do amateur footballers' sense of team identification and BPN satisfaction influence motivational profile shifts?
- H5: How do motivational profiles affect experiences of burnout and physical manifestations of burnout?

6.2 Method

6.2.1 Participants

Football was selected as the focus of this study as it offered an easily accessible population because it is the national sport of the UK. There were 338 (89% male; 93% white; Mx_{age} = 43.76, SD = 16.72) amateur footballers who participated in the study at time 1 and 194 footballers at time 2 (92% male; 95% white; Mx_{age} = 47.34, SD = 17.36). Participants were sampled from either 11-a-side or walking football formats. The footballers in this study had been competing in their sport for 10.97 (SD = 11.68) years at time 1 and 8.56 (SD = 10.55) years at time 2, approximately six months later. This time period was selected primarily because it broadly reflected the period of

the amateur football season in England (i.e., November to May) and was broadly in line with previous LTA research (e.g., Cece et al., 2018; Martinent & Decret, 2015).

6.2.2 Procedure

All data were anonymised and collected using Qualtrics. Participants were recruited through the Prolific platform using the method described in the previous chapters. Ethical approval was obtained from the Staffordshire University Ethics Committee. Participants received information about the study before agreeing to participate with consent provided electronically. Participants who took part were asked to complete a survey containing five validated measures (see Appendix J for full details). Participants were reimbursed for their time through payment equivalent to £6 per hour prorated for their participation.

6.2.3 Measures

6.2.3.1 Burnout. The ABQ is a 15-item self-report measure that assesses three dimensions of burnout in athletes: emotional and physical exhaustion (i.e., the perception that emotional and physical resources have been depleted beyond what is expected from training and competition), sport devaluation (i.e., development of cynicism towards sports involvement), and reduced sense of accomplishment (i.e., evaluating sporting abilities and achievements negatively; Raedeke & Smith, 2001). Items were rated on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). The ABQ has been shown to have good internal consistency, with Cronbach's alpha coefficients ranging from .76 to .86 for the subscales (Raedeke & Smith, 2004). This study found the Cronbach's alphas exceeded .81 for each of the subscales.

6.2.3.2 Physical Health. The Physical Health Questionnaire (PHQ) is a 14-item self-report measure that assesses physical health in the areas of gastrointestinal problems, headaches, sleep disturbance, and respiratory infections (Schat et al., 2005). The first three areas of health are measured on a scale from 1 (not at all) to 7 (all of the time). The respiratory infection items are measured on a 7-point frequency scale ranging from, for example, 1 day to 7+ days. The PHQ has been shown to have good reliability, with Cronbach's alpha of .83, .88, .80, and .66. for stomach problems, headaches, sleep disturbance, and colds, respectively. This study found the Cronbach's alphas exceeded .81 for each of the subscales. The PHQ has been found to have good construct validity, with correlations moderate to strong correlations to other measures of health (Schat et al., 2005; Zijlema et al., 2013).

6.2.3.3 Social Identification. The Four-Item Social Identification (FISI) scale contains four-items on a scale from 1 (strongly disagree) to 7 (strongly agree; Doosje et al., 1995). It is suggested for use when needing to restrict the number of items in a particular survey, such as the case for this study (Postmes et al., 2013). This study found the Cronbach's alpha exceeded .94 for this measure. A global score of social identification was calculated by summing and dividing by the four items. The rationale for adopting this approach was based on the findings from Study 1, which found that the individual constructs of self-investment distinguished the latent profiles in quantitative rather than qualitative terms.

6.2.3.4 Motivation. The Sport Motivation Scale-II (SMS-II) is an 18-item self-report measure that assesses different types of behavioural regulations in sport on a scale from 1 (strongly disagree) to 7 (strongly agree; Pelletier et al., 2013). The SMS-II has been shown to have good reliability, with Cronbach's alpha ranging from .73 to .86. This study found the Cronbach's alphas exceeded .81 for each of the subscales with the exception of introjection, external motivation, and amotivation which ranged from .62 to .69. The SMS-II has been found to have good construct validity, with correlations between the SMS-II and other measures of motivation ranging from .35 to .64 (Pelletier et al., 2013).

6.2.3.5 Basic Psychological Needs. The Basic Needs Satisfaction in Sport Scale (BNSSS) is a 20-item self-report measure that assesses the degree to which athletes' BPN for autonomy, competence, and relatedness are satisfied through participation in sport (Ng et al., 2011). Autonomy can be further assessed by three components: choice, volition, and internal perceived locus of causality. However, for this study, the autonomy factor was combined to create a global score for autonomy. Items are scored from 1 (not at all true) to 7 (very true). The BNSSS has also been shown to have good construct validity, with correlations between the BNSSS and other measures of motivation and burnout being in the hypothesised direction (Ng et al., 2011). This study found the Cronbach's alphas exceeded .81 for each of the subscales.

6.3 Data Analysis

The LPA and LTA were conducted using Mplus 6.12 (Muthén & Muthén, 2011) on variables from the BNSSS, SMS-II, four-item social identification scale, ABQ, and PHQ. The assumption of multivariate normality was assessed and found to have been violated. Therefore, the maximum likelihood estimation with robust standard errors (MLR) estimation method was adopted when conducting LPA and LTA. The sample sizes of 338 and 194 were considered

acceptable for conducting LPA and LTA, respectively, based on recommendations in the literature (No & Hong, 2018) and previous empirical research that successfully used similar sample sizes (Kälin et al., 2023; Martinent & Decret, 2015).

For each of the two measurement points, cross-sectional LPA models were conducted with two options available. For each model (i.e., variance invariant and variance varying), the profile-specific means are estimated for each of the k number of profiles. To determine the configuration that contained the best fitting model, comparisons were made of different models using various fit indices.

For LPA, the following model fit indices were used based on recommendations in the literature: Akaike information criterion (AIC), sample-size adjusted BIC (SABIC), Bayesian information criterion (BIC), boot-strap loglikelihood ratio test (BLRT), Lo-Mendell-Rubin adjusted loglikelihood ratio test (aLRT), and entropy (e.g., Morgan et al., 2015; Sinha et al., 2021; Spurk et al., 2020; Vrieze, 2012). Smaller AIC, BIC, and SABIC values, and entropy closer to 1.00 all indicate better model fit (Spurk et al., 2020). To select the number of profiles the BLRT and aLRT tests assess whether the model with k latent profiles significantly ($p < .05$) improves model fit compared model with k - 1 (Spurk et al., 2020; Williams & Kibowski, 2016). ALRT may perform better in situations of non-normal or skewed data (Morgan et al., 2016) and BLRT is viewed as a very accurate fit indicator (Nylund et al., 2007). The chosen model should also make good theoretical and practical sense with respect to the current literature (Bauer, 2022).

LTA is a statistical technique used to analyse change over time and is an extension of latent class and LPA. Whereas LPA identifies stable latent profiles at a point in time, LTA models the movements of members between the identified latent profiles through time. This can be for two or more transition states. Having conducted separate LPA for each time point, the resultant profile solutions were used as the basis for conducting LTA (Kam et al., 2016; Nylund-Gibson et al., 2023). While having similar latent profiles at each time point is not a requirement for conducting LTA, it does assist in assessing whether profile membership changes over time. Furthermore, when the estimated mean parameters result in similar profiles across each time point, then it is reasonable to specify a full measurement invariance LTA model (Kam et al., 2016; Martinent & Decret, 2015; Nylund-Gibson et al., 2023). This constrains the means and variances across each time point when conducting the LTA. Therefore, the decision was taken to use longitudinal invariance constraints. This analysis permitted a more granular assessment of profile membership changes across each time

point (Kam et al., 2016).

Next, the latent profile membership proportions and transition probabilities were calculated. The transition probabilities describe the likelihood of a latent profile member moving profiles between time points. This was followed by including predictors for determining whether social identification and BPN predicted initial profile membership and the effect on transitions over time. To assess the predictor's effect on profile membership, multinomial logistic regression analyses were conducted. Odds ratios were calculated and provided a measure of the likelihood of motivational profile membership compared to a reference motivational profile based on each unit increase in the specific predictor. An odds ratio of 1 is indicative of no change in likelihood. In contrast, a value of less than 1 would indicate a reduction in the likelihood of being in the target motivational profile compared to the reference profile. Conversely, values above 1 increase the likelihood of being in the target motivational profile. The last step involved assessing whether motivational profile membership influenced burnout and physical health outcome variables. This was achieved by conducting one-way analysis of variance differences tests on each of the outcome variables in comparison to the identified motivational profiles at time 1 and time 2.

6.4 Results

6.4.1 Cross-Sectional Analysis

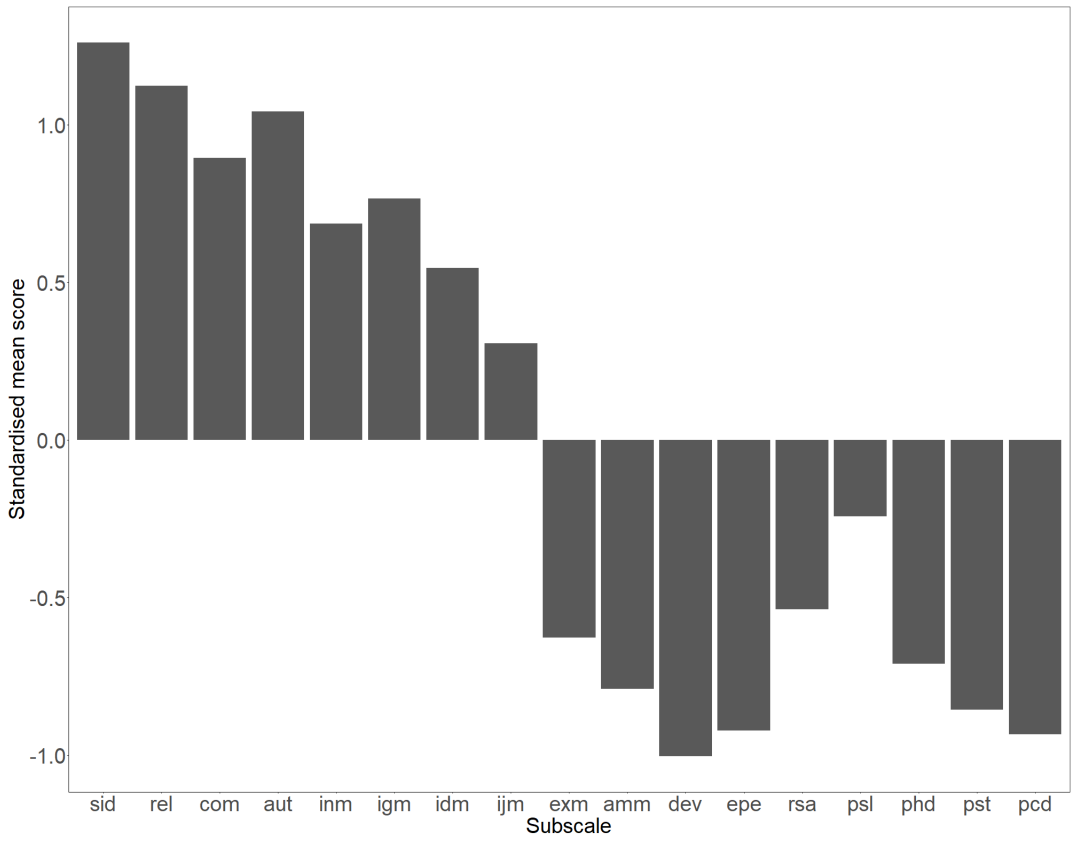
At time 1, it was observed that social identification and relatedness were, on average, the highest scored subscales (see Figure 15). The needs for autonomy and competence, and intrinsic, integrated, identified forms of motivation were also, on average, higher than the remaining subscales. External motivation, amotivation, burnout, and physical health factors were all observed to have lower scores on average. This asymmetry in scoring was in the expected direction and supported by the correlations between each subscale. For instance, intrinsic motivation was found to be positively correlated with relatedness and negatively associated with burnout (see Table 18).

Physical health factors (i.e., digestive, sleep, and respiratory issues) had a significant weak negative relationship with social identification, relatedness, and autonomy. All physical health factors had a significant weak positive relationship with external motivation and amotivation. Athlete burnout factors were observed to have a strong positive correlation with amotivation and, in the case of devaluation, a moderate negative correlation with social identification.

Overall, at time 2, there were some small changes in the overall average subscale scores, which can be seen in the similarity in the standardised mean scores (see Figure 16). The greatest

Figure 15

Latent profiles containing four subgroups at time 1



Note. sid = Social identification, rel = Relatedness, aut = Autonomy, com = Competence, inm = Intrinsic, igm = Integrated, idm = Identified, ijm = Introjected, exm = External, amm = Amotivation, dev = Devaluation, epe = Emotional/physical exhaustion, rsa = Reduced accomplishment, psl = Sleep disturbances, phd = Headaches, pst = Digestive problems, pcd = Respiratory illness.

correlation increases were seen with the burnout and physical health factors (see Table 19). For instance, the correlation between reduced sense of accomplishment and devaluation was .31 at time 1 and increased to .52 at time 2. Reduced sense of accomplishment had a weak correlation with digestive problems at time 1 (.17) and a moderate correlation (.31) at time 2.

The models were tested for gradual inclusion of latent profiles up to and including six profiles (see Table 20). The models where variance was allowed to be freely estimated produced the lowest fit indices compared with the equal variances model. However, the models did not converge due to local maxima, which remained even after increasing the iterations up to 20,000. Therefore, these models were excluded from the selection process. The equal variance models showed continued improvement in AIC, BIC, and SABIC for each additional profile. To balance the statistical fit indices with the theoretical features of the profiles, the model parameters were examined for the three and four-profile solutions.

Table 18

Means, standard deviations, and correlation for subscales at time 1

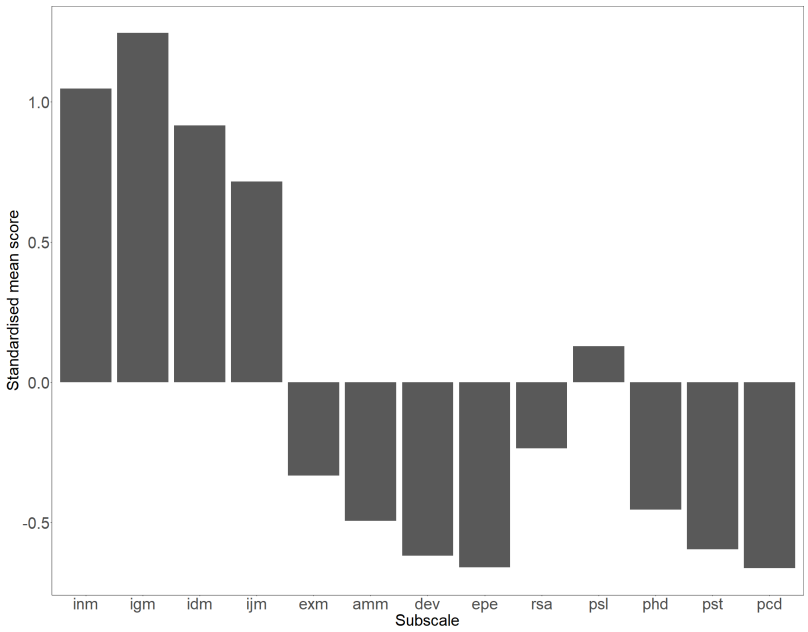
	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Social identification	6.17	.98																
2	Relatedness	5.91	.94	.53*															
3	Competence	5.48	1.08	.23*	.39*														
4	Autonomy	5.76	.78	.53*	.63*	.49*													
5	Intrinsic motivation	5.09	1.23	.33*	.40*	.39*	.40*												
6	Integrated motivation	5.23	1.34	.41*	.43*	.48*	.53*	.51*											
7	Identified motivation	4.82	1.37	.28*	.37*	.36*	.40*	.77*	.53*										
8	Introjected motivation	4.37	1.25	.23*	.31*	.30*	.28*	.42*	.53*	.51*									
9	External motivation	2.62	1.33	.03	.13*	.17*	.01	.29*	.23*	.33*	.47*								
10	Amotivation	2.31	1.21	-.27*	-.11*	.05	-.27*	.10	-.03	.13*	.28*	.54*							
11	Devaluation	1.91	.75	-.42*	-.24*	-.15*	-.40*	-.23*	-.22*	-.15*	.02	.15*	.46*						
12	Emotional/physical exhaustion	2.06	.76	-.16*	-.04	-.11*	-.19*	-.08	-.16*	.01	.11*	.24*	.40*	.55*					
13	Reduced sense of accomplishment	2.78	.38	-.01	.01	-.02	-.06	.06	.07	.08	.21*	.18*	.32*	.43*	.31*				
14	Headaches	3.34	.77	-.08	-.06	-.03	-.09	.01	.00	.02	.08	.17*	.24*	.18*	.24*	.26*			
15	Digestive problems	2.46	1.31	-.14*	-.11*	.08	-.14*	.07	.01	.11*	.11*	.22*	.24*	.25*	.25*	.17*	.41*		
16	Sleep disturbances	2.19	1.21	-.17*	-.13*	-.03	-.17*	-.02	-.07	.00	.04	.18*	.26*	.31*	.32*	.29*	.42*	.55*	
17	Respiratory illness	2.04	.82	-.17*	-.13*	-.04	-.15*	.07	-.04	.09	.10	.21*	.26*	.24*	.31*	.24*	.39*	.47*	.60*

Note. M and SD are used to represent mean and standard deviation, respectively. * indicates $p < .05$.

As a result, the four-profile solution was preferred for time 1 because it provided distinct profiles that were in line with past research. Furthermore, the distinct profiles remained stable when compared to time 2 latent profiles containing four profiles. Conversely, the three-profile solution contained a profile that was substantially different at time 2 and lacked interpretability. Both points were considered important factors because each latent profile solution would be used in the subsequent LTA. Examining the results for time 2 showed improvements in AIC, BIC, and SABIC for additional profiles. The aLRT was found to be nonsignificant, and aLRT remained nonsignificant for each additional profile. The average posterior profile probabilities were also reviewed to ensure the accuracy of the profile classifications. For time 1 and time 2, all profile classifications were in excess of the .90 ideal cutoff with the exception of one profile with a value of .89, which was considered an acceptable level (Muthen & Muthen, 2000; Weller et al., 2020). Consequently, the four-profile solution was selected based on the similarity of latent profiles to time 1 and their theoretical interpretability. The four profiles for time 1 and time 2 are shown in

Figure 16

Standardised mean scores for subscales at time 2



Note. inm = Intrinsic, igm = Integrated, idm = Identified, ijm = Introjected, exm = External, amm = Amotivation, dev = Devaluation, epe = Emotional/physical exhaustion, rsa = Reduced accomplishment, psl = Sleep disturbances, phd = Headaches, pst = Digestive problems, pcd = Respiratory illness.

Figure 17 and Figure 18, respectively. The motivational profiles for both measurement points are broadly the same in relation to the mean estimates for each regulatory form of motivation. Each profile represented a unique type of motivation. The self-determined profile (N = 97 and 33 for time 1 and 2, respectively) reflected members with high scores for autonomous regulatory types of motivation and low scores on more controlled forms. The second profile (N = 159 and 86) described moderately self-determined members. Scores were similarly distributed as the self-determined profile but with lower scores for autonomous forms of motivation. The next profile (N = 22 and 27) was described as containing members who were experiencing low motivation, with nearly all scores below the mid-point of the scale. Yet, scores on external motivation and amotivation were the lowest of all the subgroups. The last profile (N = 60 and 48) was described as controlled motivation because it contained the highest scores of the four profiles on introjected and external motivation, and amotivation.

The latent profile membership proportions changed between time 1 and time 2. Notably, the profile proportions decreased for the most adaptive profiles of self-determined and moderately self-determined profiles and increased in the remaining profiles. In the case of the self-determined profile, the membership proportion decreased by more than 10%. The low motivational profile more

Table 19

Means, standard deviations, and correlation for subscales at time 2

	Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1	Intrinsic motivation	4.80	1.29												
2	Integrated motivation	5.11	1.43	.54*											
3	Identified motivation	4.60	1.37	.80*	.53*										
4	Introjected motivation	4.28	1.34	.55*	.53*	.53*									
5	External motivation	2.64	1.37	.39*	.24*	.42*	.51*								
6	Amotivation	2.38	1.25	.09	-.04	.11	.24*	.62*							
7	Devaluation	2.19	0.78	-.24*	-.26*	-.20*	-.03	.19*	.45*						
8	Emotional/physical exhaustion	2.12	0.80	-.05	-.21*	.01	.08	.26*	.44*	.61*					
9	Reduced sense of accomplishment	2.79	0.44	.02	.01	.02	.15*	.28*	.36*	.50*	.52*				
10	Headaches	3.36	0.74	.02	.15*	.05	.17*	.18*	.15*	.14	.17*	.21*			
11	Digestive problems	2.45	1.31	.06	-.01	.12	.13	.20*	.24*	.31*	.44*	.31*	.37*		
12	Sleep disturbances	2.23	1.12	.12	.01	.18*	.10	.27*	.26*	.26*	.41*	.33*	.34*	.43*	
13	Respiratory illness	2.12	0.93	.10	-.01	.14	.08	.31*	.28*	.33*	.41*	.32*	.41*	.49*	.68*

Note. M and SD are used to represent mean and standard deviation, respectively. * indicates $p < .05$.

than doubled its proportion to 13.9%. Whilst these results were taken from the cross-sectional analysis, they provide an indication of inter-individual movements over time.

These profiles were further evaluated by comparing the differences in subscales using analysis of variance tests (see Appendix K for outputs). For time 1 and time 2, many of the differences in mean scores for the regulatory forms of motivation were found to be significantly different. Notably, the difference between the self-determined and controlled motivation profiles for the subscales of identified ($p = .12$) and introjected motivation ($p = .08$) were nonsignificant. There was a nonsignificant difference between the self-determined and moderately self-determined profiles for external motivation ($p = .12$). Nonsignificant differences were found between the self-determined, moderately self-determined, and low motivation profiles for amotivation at time 1 and time 2. A similar pattern of results was observed for introjected motivation, but there were also some changes from time 1. External motivation scores were significantly different between the four profiles. The difference between the moderately self-determined and controlled motivational profiles

Table 20

Model fit statistics for time 1 and time 2

	k	LL	SCF	#fp	AIC	BIC	SABIC	Entropy	aLRT	BLRT
TIME 1. Equal variances across profiles										
	2	-3171.89	1.18	19	6381.77	6454.41	6394.14	.78	.00	<.05
	3	-3103.31	1.11	26	6258.62	6358.02	6275.54	.87	.00	<.05
	4	-3045.73	1.14	33	6157.46	6283.62	6178.94	.85	.01	<.05
	5	-3015.90	1.31	40	6111.80	6264.72	6137.83	.81	.42	<.05
	6	-2995.10	1.50	47	6084.20	6263.88	6114.79	.78	.64	<.05
TIME 1. Variances free in all profiles										
	2	-3131.02	1.12	25	6312.04	6407.61	6328.31	.82	.00	<.05
	3	-3026.99	1.22	38	6129.99	6275.26	6154.72	.80	.04	<.05*
	4	-2964.20	1.19	51	6030.39	6225.37	6063.59	.85	.10	<.05*
	5	-2914.22	1.08	64	5956.45	6201.12	5998.11	.86	.04	<.05*
	6	-2882.23	1.13	77	5918.45	6212.83	5968.57	.86	.38	<.05
TIME 2. Equal variances across profiles										
	2	-1870.12	1.28	19	3778.23	3840.32	3780.13	.81	.06	<.05
	3	-1812.32	1.21	26	3676.64	3676.64	3679.24	.83	.07	<.05
	4	-1769.98	1.24	33	3605.96	3713.80	3609.26	.83	.13	<.05
	5	-1739.52	1.26	40	3559.04	3689.75	3563.04	.86	.32	<.05
	6	-1713.14	1.09	47	3520.28	3673.87	3524.99	.87	.05	<.05
TIME 2. Variances free in all profiles										
	2	-1832.42	1.07	25	3714.85	3796.54	3717.35	.81	.00	<.05
	3	-1755.35	1.17	38	3586.70	3710.88	3590.50	.85	.12	<.05*
	4	-1711.51	1.17	51	3525.03	3691.69	3530.13	.86	.27	<.05*
	5	-1669.61	1.08	64	3467.23	3676.37	3473.63	.88	.06	<.05*
	6	-1645.98	1.11	77	3445.95	3697.58	3453.66	.90	.57	<.05*

Note. k = Number of latent profiles in the model; LL = Model loglikelihood; #fp = Number of free parameters; SCF = Scaling correction factor of the robust maximum likelihood estimator; AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample-size adjusted BIC; aLRT = Adjusted likelihood ratio test; BLRT = Bootstrap likelihood ratio test. *Models failed to converge and may indicate local maxima.

was nonsignificant for scores on integrated motivation at time 2, with all other scores found to be significantly different.

6.4.2 Longitudinal Analysis

A fully measurement invariant LTA model was specified because the LPA motivational profiles were consistent over time. This meant that the four motivational profiles were held constant across time 1 and time 2. The final LTA solution was confirmed by conducting multiple random starts to ensure the model was converging and replicating the log-likelihood. The latent motivational profile (see Figure 19) produced by the LTA was broadly in keeping with those produced in study three.

Figure 17

Latent profiles containing four subgroups at time 1

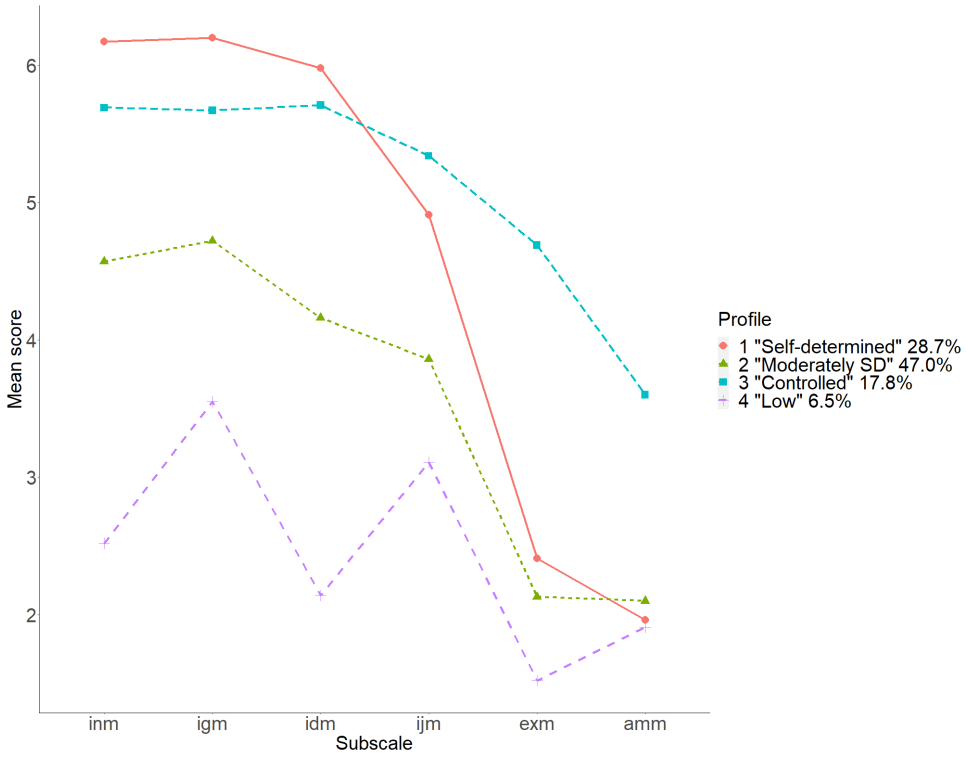
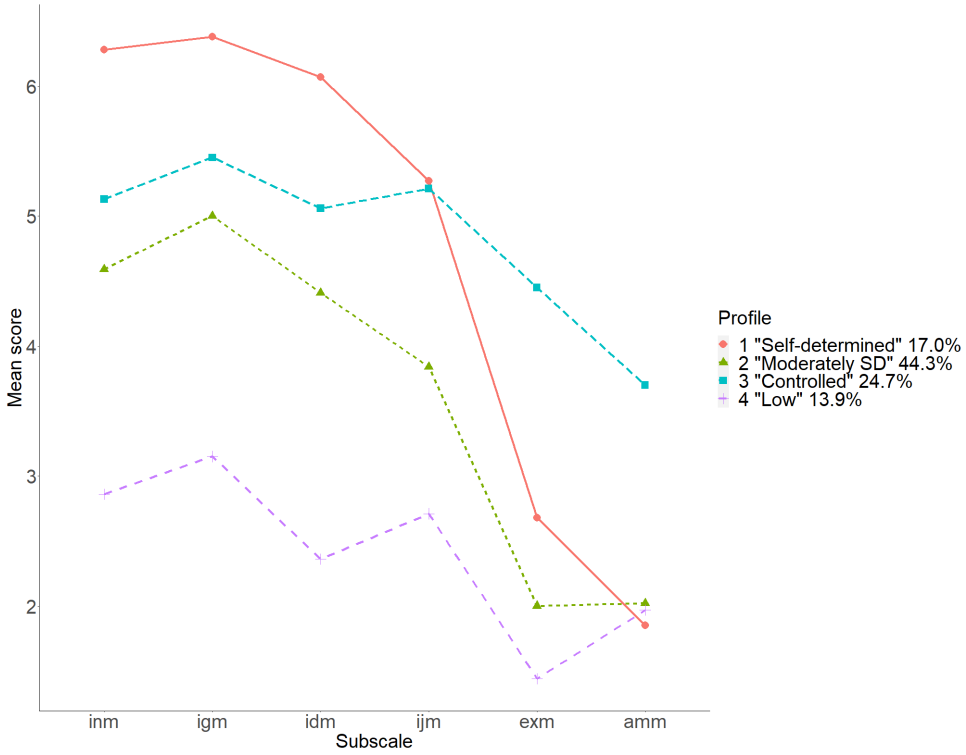


Figure 18

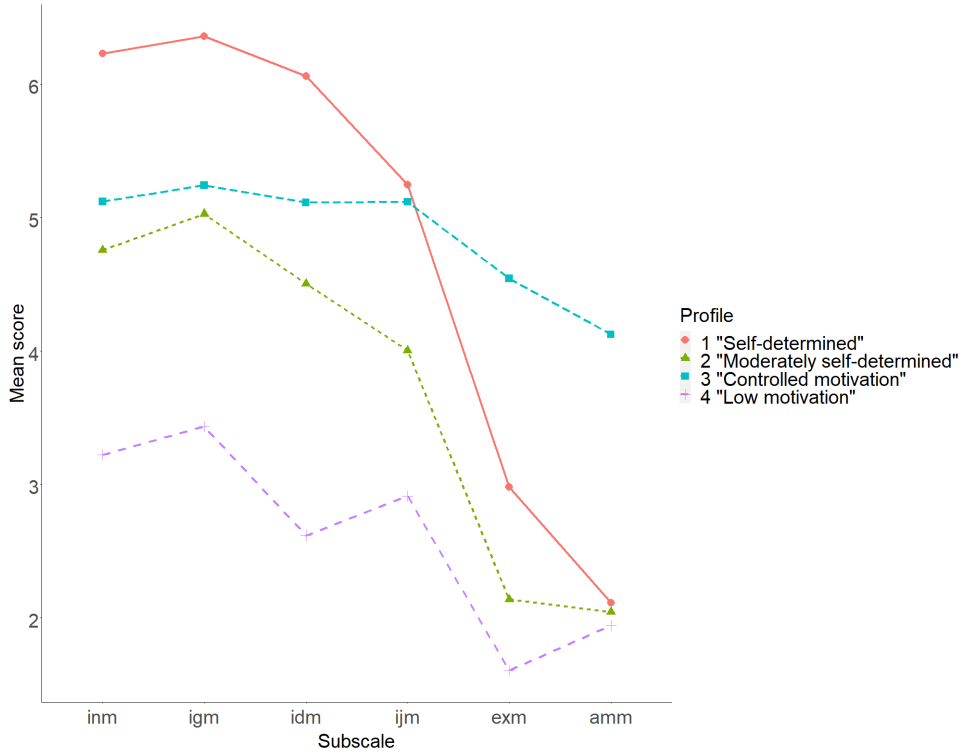
Latent profiles containing four subgroups at time 2



Note. inm = Intrinsic, igm = Integrated, idm = Identified, ijm = Introjected, exm = External, amm = Amotivation.

Figure 19

Latent profile transition analysis fully invariant



Note. inm = Intrinsic, igm = Integrated, idm = Identified, ijm = Introjected, exm = External, amm = Amotivation

Table 21

Latent profile transition probabilities from time 1 to time 2

	Time 2			
Time 1	Self-determined	Moderately SD	Low motivation	Controlled motivation
Self-determined	.67	.18	.15	.00
Moderately SD	.08	.82	.00	.10
Low motivation	.00	.00	1.00	.00
Controlled motivation	.00	.13	.14	.73

The latent transition probabilities for the LTA are presented in Table 21 and contain the probabilities of latent profile members at time 2 conditional on their motivational profile at time 1. Those who remained in the same latent profile from time 1 to time 2 are reflected in the diagonal values. Generally, motivational profile membership remained stable over time for the vast majority, with values greater than .67 for each profile. Notably, it was found that members of the low

motivational profile had zero likelihood of changing their profile from time 1 to time 2. The self-determined motivational profile had the greatest likelihood of members moving to either the moderately self-determined or low motivational profiles. Members that transitioned from the controlled motivational profile moved to either moderately self-determine or low motivational profiles, but not to the most adaptive self-determined profile.

Table 22

Association of time 1 social identification and basic psychological needs with motivational profiles at time 1

Model — Time 1	Mean	SD	Estimate	se	Odds Ratio	p
Self-determined profile						
T1 Social identification	6.71	0.44	1.02	0.43	2.77	< .05*
T1 Autonomy	6.31	0.43	1.34	0.58	3.83	< .05*
T1 Competence	6.16	0.78	0.95	0.33	2.58	< .05*
T1 Relatedness	6.46	0.60	0.87	0.42	2.38	< .05*
Moderately self-determined						
T1 Social identification	6.12	0.96	0.16	0.29	1.17	.59
T1 Autonomy	5.75	0.66	0.56	0.54	1.75	.30
T1 Competence	5.27	0.95	0.22	0.29	1.24	.46
T1 Relatedness	5.84	0.89	0.47	0.31	1.60	.13
Controlled motivational profile						
T1 Social identification	5.62	1.04	-0.18	0.26	0.84	.50
T1 Autonomy	5.12	0.76	-1.02	0.54	0.36	< .05*
T1 Competence	5.50	1.02	0.86	0.44	2.37	< .05*
T1 Relatedness	5.66	0.97	0.97	0.33	2.63	< .05*
Low motivational profile (constant)						
T1 Social identification	5.60	1.20				
T1 Autonomy	5.11	0.89				
T1 Competence	4.68	1.30				
T1 Relatedness	5.12	1.02				

Note. T1 = Time 1. * indicates $p < .05$.

Table 23

Association of time 1 social identification and basic psychological needs with motivational profiles at time 2

Model — Time 2	Estimate	se	Odds Ratio	p
Self-determined profile				
T1 Social identification	1.29	0.62	3.64	< .05*
T1 Autonomy	0.72	0.94	2.06	.44
T1 Competence	-0.97	0.76	0.38	.21
T1 Relatedness	0.23	1.29	1.26	.86
Moderately self-determined				
T1 Social identification	0.37	0.29	1.44	.21
T1 Autonomy	-0.07	0.74	0.93	.92
T1 Competence	0.07	0.38	1.07	.85
T1 Relatedness	-0.99	0.95	0.37	.30
Controlled motivational profile				
T1 Social identification	0.08	0.96	1.09	.93
T1 Autonomy	-0.84	0.71	0.43	.24
T1 Competence	-1.15	0.68	0.32	.09
T1 Relatedness	1.49	1.20	4.43	.22
Low motivational profile (constant)				

Note. T1 = Time 1. * indicates $p < .05$.

Several logistic regressions were conducted to determine whether social identification and BPNs predicted membership of initial or later motivational profiles. The results for time 1 and time 2 comparisons are presented in Table 22 and Table 23, respectively. For each comparison, the low motivational profile acted as the reference group with which to compare the remaining three profiles. Membership of the moderately self-determined motivational profile was not found to be any more likely based on scores on social identification or BPN compared with the low motivational profile. However, results did show that higher scores in competence and relatedness made profile membership of the self-determined and controlled motivational profiles significantly more likely than compared with the reference group. Self-determined profile membership was also found to be significantly more likely with higher scores for social identification and autonomy. Conversely, higher scores in autonomy reduced the risk of controlled motivational profile membership compared

Table 24

Mean, standard deviation, and analysis of variance difference tests for burnout and physical health outcomes at time 1 and time 2

	Profile								
	1		2		3		4		
	Self-determined		Moderately self-determined		Controlled motivation		Low motivation		Pairwise comparisons
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Burnout - Time 1									
Devaluation	1.63	0.60	1.91	0.74	2.45	0.80	2.05	0.79	3 > 1, 2, 4; 2, 4 > 1
Emotional/ physical exhaustion	1.89	0.79	2.05	0.71	2.59	0.84	2.01	0.62	3 > 1, 2, 4
Reduce accomplishment	2.82	0.39	2.75	0.35	2.96	0.39	2.66	0.39	3 > 2, 4
Burnout - Time 2									
Devaluation	1.84	0.76	2.08	0.64	2.75	0.92	2.46	0.73	3 > 1, 2, 4; 4 > 1
Emotional/ physical exhaustion	1.89	0.75	2.08	0.72	2.75	0.84	1.99	0.74	3 > 1, 2, 4
Reduce accomplishment	2.76	0.39	2.73	0.38	3.11	0.62	2.71	0.32	3 > 1, 2, 4
Physical health - Time 1									
Digestive problems	2.16	1.12	2.05	1.12	2.78	1.42	2.21	1.37	3 > 1, 2
Headaches	2.45	1.16	2.34	1.26	3.18	1.42	2.27	1.20	3 > 1, 2, 4
Respiratory illness	2.06	0.83	1.92	0.76	2.54	0.97	1.95	0.71	3 > 1, 2, 4
Sleep disturbances	3.27	0.80	3.27	0.68	3.78	0.78	3.32	0.88	3 > 1, 2, 4
Physical health - Time 2									
Digestive problems	2.17	1.05	2.42	1.07	3.32	1.28	2.03	0.78	3 > 1, 2, 4
Headaches	2.09	1.16	2.16	1.26	3.06	1.42	1.79	1.20	3 > 1, 2, 4
Respiratory illness	3.38	0.74	3.24	0.84	3.78	1.21	3.28	0.75	3 > 1, 2, 4
Sleep disturbances	1.98	0.62	2.04	0.67	2.89	0.98	1.79	0.68	3 > 2, 4

Note. SD = Standard deviation.

to the low motivational profile. At time 2, only social identification was found to be a significant predictor, with higher scores increasing the likelihood of profile membership compared with the reference group. Although a nonsignificant result, the odds ratio for competence predicting profile membership for self-determined and controlled motivational profiles changed from increasing the

likelihood of group membership to substantially reducing the risk. As expected, the mean scores showed that the self-determined profile had the highest scores, and the low motivational profile had the lowest scores for each predictor. One-way analysis of variance was conducted to examine whether differences existed in burnout and physical health outcomes associated with specific motivational profiles at either time 1 or time 2 (see Table 24 for summary and Appendix K for full details). More generally, reduced sense of accomplishment was the highest scored burnout component for each motivational profiles at each time point. In addition, the controlled motivational profile was found to have significantly higher scores for each of the burnout components compared to the other three profiles. The only exception being reduced sense of accomplishment at time 1, which was not significantly different to the self-determined profile. In addition, devaluation at time 1 was found to be significantly higher for the moderately self-determined and low motivational profiles compared to the self-determined profile.

A similar trend was observed for the individual components of the physical health scale with the controlled motivational profile found to have significantly worse scores on each of the components compared with all other motivational profiles at time 1 and time 2. Digestive problems at time 1 and sleep disturbances at time 2 were the only components not significantly different to low motivational and self-determined profiles. Controlled motivational profile was found to have the two highest scoring components at time 1 (i.e., sleep disturbances) and time 2 (i.e., respiratory illness). The lowest scores were seen for the moderately self-determined at time 1 (i.e., respiratory illness) and low motivational profiles at time 2 (i.e., headaches and sleep disturbances).

6.5 General Discussion

This study has extended earlier work on motivational profile research in several important ways. First, this study provided evidence of the heterogeneity that existed in the amateur football population in the UK (H1). Second, the identified motivational profiles were broadly in line with previous research, demonstrating the generalisability of certain motivational profiles across different samples, and reflecting both optimal and maladaptive functioning (H2). Third, the study provided evidence of stability over time (H3) in the motivational profile trends but also how membership of these profiles typically remained stable. This study uniquely demonstrated the role of BPN and social identification in predicting profile membership over time (H4). Fifth, the study showed that different motivational profiles were associated with different well-being and physical health outcomes (H5).

6.5.1 Motivational Profiles

The findings from this study add to the growing body of research on motivational profiles by providing further evidence on the specificity of particular profile types (e.g., Cece et al., 2018; Gillet et al., 2017; Martinent & Decret, 2015). The analysis revealed four motivational profiles, which answered the first research question: self-determined, moderately self-determined, low motivational profile, and controlled motivational profile. The four-profile solution compared favourably to those identified in the motivational profile literature (e.g., Martinent & Decret, 2015; Saward et al., 2024). The range of profiles could be placed along a continuum from most adaptive to most maladaptive, providing evidence towards the second research question. Additionally, corroborating evidence supported the proposition that multiple regulatory types of motivation can and do underpin the reasons for ingroup members engaging in particular behaviours (Gustafsson, Carlin, et al., 2018; Ryan et al., 2009). In particular, the controlled motivational profile, defined by relatively high autonomous and controlled regulatory forms of motivation, in contrast to the remaining profiles, reflected findings from previous studies (Gustafsson, Carlin, et al., 2018; Wang et al., 2016).

This study examined motivational profiles at two-time points, approximately six months between the initial and follow-up data collection. The motivational profiles found at time 1 and time 2 contained four distinct profiles that shared the same general profile structure. This finding provides support for the third research question. The temporal stability of the profile structures has two important implications. First, it supports the wider generalisability of past cross-sectional studies where previously these may have been seen as time specific. Second, the findings build on the current evidence on motivational profiles by introducing a new population in the shape of amateur footballers.

The study findings identified four distinct motivational profiles at times 1 and time 2. Additionally, the results showed a clear pattern of greater membership of adaptive motivational profiles, and also that profile membership proportions changed over time. In particular, the moderately self-determined profile contained the largest membership proportions at both time points, accounting for almost half of the sample. The smallest profile by membership proportion was the low motivational profile at both points in time, which makes theoretical sense given the low levels of reported motivation. Each of these findings replicates findings from previous research studies (Gillet et al., 2009; Gustafsson, Carlin, et al., 2018; Saward et al., 2024). Taken together,

these findings suggested that activities driven for purely self-determined reasons were much less likely for ingroup members in this sample, with most ingroup members reporting less autonomous forms of motivation associated with playing football.

The most adaptive motivational profiles (i.e., self-determined and moderately self-determined) decreased in membership proportions over time. For instance, the self-determined profile membership proportion decreased by more than 11.0% while the low motivational profile more than doubled its proportion to 13.9%. This finding indicated inter-individual movements over time, although it is important to note the cross-sectional nature of these results. Furthermore, analysis of separate LPA in this way was severely limited as it did not provide any indication of how membership proportions were distributed across each of the motivational profiles. For example, the entire proportion that left the self-determined profile could have moved to the moderately self-determined profile, with the same proportion moving between the moderately self-determined and controlled profile. Only through conducting LTA could it identify the specific profile-to-profile transitions.

6.5.2 Transitions

The fourth research question was concerned with motivational profile stability. The longitudinal design provided evidence of the temporal features of BPN and social identification and the movement patterns of subgroup members between motivational profiles. Overall, the study showed that membership to a particular motivational profile was highly likely to remain stable over time. The self-determined profile was found to have the lowest profile stability (.67) and was generally in line with previous research in terms of the degree of stability over time (Corpus & Wormington, 2014; Gillet et al., 2017; Martinent & Decret, 2015). The LTA also confirmed the movement away from the self-determined profile that was observed in the cross-sectional analysis. However, the major difference was the additional information provided by the LTA on the destination of the participants. There was a relatively even split between the moderately (.18) and low (.15) motivational profiles. The lack of transitions to the controlled motivational profile showed this profile's place as the more maladaptive of the four profiles. A point that was further supported by a similar split between the moderately (.13) and low (.14) motivational profiles for those transitioning from the controlled motivational profile.

Unlike previous studies that found individuals typically moving from less to more adaptive motivational profiles, this was not the case here (e.g., Cece et al., 2018). Yet, the transition

probabilities showed evidence that members did not move more than two profiles up or down, which has been found elsewhere (e.g., Gillet et al., 2017). This finding supported the ordering of the motivational profiles from most adaptive (i.e., self-determined) to most maladaptive (i.e., controlled motivation). Participants in the low motivational profile, who constituted the smallest profile membership, were found to have a 100% likelihood of remaining in this profile at time 2. Previous studies have reported high probabilities for this group remaining largely stable over time (Martinent & Decret, 2015). The general low levels of motivation reported by participants in this group might partially explain the lack of transitions away from this profile because all three remaining profiles contain autonomous forms of motivation that are two to three points higher. This would constitute a significant shift in autonomous forms of motivation.

Participants in the low motivational profile also reported the lowest scores across each of the predictors of BPN and social identification, which was the focus of the fifth research question. Moreover, the lower scores in BPN, which would have helped to facilitate the experience of more autonomous forms of motivation (Deci et al., 2017), were also lower than for all other profiles. This was further exposed through the logistic regressions, where the low motivational profile was used as the reference group.

The results of the logistic regressions showed that satisfaction of autonomy, competence, and relatedness were significant predictors in determining profile membership for the self-determined and controlled motivational profiles. A higher degree of satisfaction for each of the BPN and greater team identification substantially and significantly increased the likelihood of profile membership within the self-determined profile. The pattern of results differed for participants in the controlled motivational profile. While a greater degree of competence and relatedness satisfaction increased the likelihood of membership in the controlled motivational profile, higher autonomy satisfaction had the opposite effect.

The satisfaction of competence and relatedness were associated with a greater likelihood of individuals being in either the self-determined or controlled motivational profiles compared with being a member of the low motivational profile. This supported the notion that a lack of BPN satisfaction might partially explain a lack of transitions for individuals in this profile. A main tenet of the SDT framework is that satisfaction of BPN helps to facilitate behaviours being experienced as intrinsically motivated (Deci & Ryan, 2002). However, this is unlikely to be the only factor contributing to participants remaining in this particular group, nor the general lack of reported

motivation. Activity attendance and adherence are possible factors that have previously been linked to levels of BPN satisfaction where, for example, higher reported levels of relatedness lead to increased attendance (Edmunds et al., 2007; Teixeira et al., 2012; Vlachopoulos et al., 2000). Thus, participants who were 'stuck' in the low motivational profile might have been a consequence of a repeated pattern of reduced activity engagement leading to frustration of BPN, which caused further disengagement.

As previously reported, self-determined motivational profile membership was significantly predicted by higher scores in each predictor. Yet, initial satisfaction of BPN did not predict profile membership at time 2. A similar result was found in a previous study where initial levels of BPN satisfaction were only able to predict initial profile membership (Cece et al., 2018). Additionally, BPN frustration was also measured and found to predict profile membership in terms of autonomy and general need frustration. The authors suggested that BPN might have a time-limited effect for predicting motivational profiles and are much more likely to fluctuate with time. However, LTA studies that have examined BPN profiles found that profile membership tended to be highly stable, especially where BPN satisfaction was reported (Gillet et al., 2019; Grasten et al., 2023; Huyghebaert-Zouaghi et al., 2022; Martinent et al., 2021). Two possible explanations have been suggested for the waning effect of BPN (Cece et al., 2018). First, BPN might fluctuate over time, such as during the course of a football season, and second, their effects are context-dependent (Cece et al., 2018; Standage et al., 2003; Vallerand et al., 1997). In the context of recreational football, the potential for BPN to be effected by external factors during the course of a season seems highly likely. For instance, feedback on performance based on a team's position in the league would likely affect competence satisfaction. An alternative explanation could relate to the stability of the motivational profiles and the impact of BPN on facilitating initial group membership. A proposition within the SDT frameworks suggests that the degree that satisfaction of BPN is blocked will lead to signs of maladaptive motivations and poorer outcomes in terms of performance or health (Ryan & Deci, 2017b). Whilst profile membership remained relatively stable over time the greatest proportion of transitions occurred in the self-determined and controlled motivational profiles. In contrast, remaining in the low motivational profile was a certainty, and this would have impacted the predictive effects of BPN at follow-up. Thus, those who did remain in the self-determined profile were predicted to do so based on their level of social identification alone.

As the predictive power of the BPN waned after the initial time point, team identification

at time 1 could still predict self-determined profile membership at time 2. As previously mentioned, it has been suggested that the effects of BPN might be much more temporal, whereas it would appear that team identification was much more stable across time, at least for the self-determined profile. Past research has suggested that a strong exercise identity can facilitate motivation when the particular behaviour reinforces the identity (Ntoumanis et al., 2018). Furthermore, the process of social identification has been hypothesised to facilitate previously extrinsic behaviours into being experienced as intrinsically motivated (Greenaway et al., 2020). Moreover, proponents of the SIA have suggested that a shared social identity leads to group members being more motivated by a set of shared needs and goals, which form the foundation for teamwork (e.g., Greenaway et al., 2020; Haslam et al., 2000). Past studies have provided support to this notion of greater team identification being associated with greater motivation (e.g., Beauchamp et al., 2018; Slater et al., 2018). Thus, team identification has more predictive powers in identifying those who are likely to experience more self-determined forms of motivation in the longer term and provides support to the "social cure" basis for improving health, by promoting the development of social identity within group settings. Additionally, had the relationship from BPN to the regulatory types been mediated by social identification, as has been the case in other longitudinal studies (Amiot et al., 2010; Greenaway et al., 2017), then this might have extended the initial degree of BPN to predicting latent profile membership at follow-up. However, BPN satisfaction still has a role to play but might be more important at the initial stages of group formation or at different stages of a season.

6.5.3 Outcomes

In this study, burnout and physical health outcomes were collected at both time points and used to determine whether differences in scores were associated with particular motivational profiles. This was also the first time physical health symptoms have been included in a person-centred study in the context of experiences of individuals participating in recreational sports over time. Rather, past studies have typically examined more general measures of well-being (e.g., Martinent & Nicolas, 2016; Saward et al., 2024). The findings discussed in this section relate to the fifth research question.

As previously reported, controlled motivation was found to have significantly poorer outcome scores than the remaining three profiles, with three exceptions. The findings from past research have indicated that similar motivational profiles, characterised by high scores on autonomous and controlled regulatory types of motivation, have been protected against adverse

outcomes, such as burnout, of reportedly high controlled motivation (Gustafsson, Carlin, et al., 2018; Martinent & Decret, 2015; Parker et al., 2021; Saward et al., 2024; Wang et al., 2016). This was suggested to be related to the high scores in the autonomous forms of motivation. This study did not support this finding, as the controlled motivational profile was associated with poorer health outcomes than the remaining subgroups. For instance, in five of the seven outcome variables, the scores tended to marginally worsen at time 2, and the profile was the only one to achieve scores past the mid-point in each of the outcomes across both time points. However, findings from a longitudinal study suggested examining employees' experiences also identified a similar controlled motivational profile (Parker et al., 2021). Employees initial health outcomes were in line with other studies (e.g., Martinent & Decret, 2015). However, employees who were members of the controlled motivational profile saw their health outcomes deteriorate at follow-up. A possible explanation for these differences might relate to the populations being investigated. For instance, elite athletes were the population in one study (e.g., Gustafsson, Carlin, et al., 2018), and they were likely to experience issues like deteriorating well-being in a very different way to those playing recreational sports.

The reported burnout scores for each of the profiles were in keeping with previous person-centred studies, with lower scores predominantly being associated with more adaptive profiles (Gustafsson, Carlin, et al., 2018; Martinent & Decret, 2015; Saward et al., 2024). More specifically, participants in the self-determined versus the controlled motivational profiles were not found to have significantly different scores for the burnout component of reduced sense of accomplishment at time 1. The mean score suggests that participants in either group are closer to feeling a reduced sense of accomplishment, which is a tendency for individuals to evaluate their sporting ability and achievements negatively, 'some of the time'. Notably, at time 2, the component was observed to be significantly higher for the controlled motivational profile as a consequence of a small increase in reduced sense of accomplishment for this profile, while a small reduction was observed for the self-determined profile. Importantly, at time 1, membership of the self-determined and controlled motivational profiles were found to be more likely, compared to being a member of the low motivational profile, with higher scores on competence and relatedness.

Previous studies have found that satisfaction of BPN, including competence, has been associated with reducing the effects of burnout (Martinent et al., 2021). This was further supported by the results at time 2, where initial BPN scores no longer predicted motivational profile

membership for any of the profiles. Thus, perhaps in the case of reduced sense of accomplishment, participants in the controlled motivational profile were protected, to some degree, by their experiences of BPN for competence and relatedness. A main SDT tenet concerns the role of BPN satisfaction in facilitating more autonomous forms of motivation (e.g., Deci & Ryan, 2000). In addition, participants in the controlled profile were highly motivated and satisfaction of competence and relatedness possibly facilitated more autonomous forms of motivation. When examining the controlled motivational profiles from the cross-sectional analysis, there was a decrease over time in the autonomous subscale scores. Whilst it is not possible to make a direct causal inference, it is possible that the observed decrease was associated with BPN becoming less predictive of profile membership over time.

In terms of specific physical health outcomes, scores remained broadly the same over time, with the controlled profile alone showing increases in each measured outcome. Two of the largest decreases in scores were seen for participants in the self-determined and low motivational profiles for experience of sleep disturbances. Moreover, participants in the low motivational profile also reported lower experiences of headaches. This was an unexpected result and difficult to ascertain based on the data collected. For this group of participants, the sport may not play a significant role in terms of providing important and meaningful social groups, yet, this does not mean that they are not members of other social groups, which might provide the benefits associated with the "social cure" (Jetten et al., 2017).

6.5.4 Relatedness and Social Identification

Relatedness and social identification were found to have contrasting effects within the LTA. As previously mentioned, the three BPN were only predictors of latent profile membership at the beginning of the season, whereas initial social identification was a significant predictor at both time points. At time 1, both factors were, to a similar degree of likelihood, predictors of the self-determined latent profile membership compared with membership of the low motivational profile. This is broadly in line with previous unified approach research that has indicated a relationship between BPN satisfaction, greater social identification, and more autonomous forms of motivation (Neys et al., 2014; Ntoumanis et al., 2018; Schertzinger et al., 2021).

In contrast, higher reported relatedness and competence satisfaction significantly increased the likelihood, while higher autonomy satisfaction significantly reduced the likelihood of belonging to the controlled motivational profile group relative to the low motivational profile group. Social

identification was not found to be a significant predictor of group membership. Relatedness and competence have previously been found to be significant predictors of intrinsic motivation, contrary to the finding associated with the controlled motivational subgroup (Standage et al., 2003).

There are two possible explanations for this finding. First, the high degree of controlled and autonomous regulations associated with this subgroup reflects findings from academic and physical activity settings. These studies found that introjected regulation was positively associated with relatedness, as was found in this study (e.g., Ntoumanis, 2001; Vallerand et al., 1997). The suggested explanations for this finding indicated that social agents might subtlety undermine the internalisation of a behaviour, that controlled motivation has varying outcomes dependent on the setting, or that the activity helps an individual to avoid social isolation (Ntoumanis, 2001; Vallerand et al., 1997). Each explanation for the positive association to introjected regulation equally applies to participating in recreational football.

More generally, examining the bivariate correlations for social identification and relatedness to the other subscales identified some notable relationships. As has been the case in the other two studies in this thesis, a moderate to strong positive correlation was found between social identification and relatedness. This suggested that while the two concepts are related, they are independent of one another and measure different facets of group processes. Social identification was found to have a stronger negative correlation to amotivation, devaluation, and emotional exhaustion compared with relatedness. This might be because previously, it has been suggested that negative outcomes were more likely to be better accounted for by BPN frustration factors (e.g., Vansteenkiste & Ryan, 2013). Relatedness was found to have marginally stronger positive correlations to each of the autonomous and controlled forms of regulation. Additionally, relatedness was more closely associated with the other two BPN of autonomy and competence. The bivariate correlations provide additional evidence of the different effects of social identification and relatedness within the context of a group setting.

6.5.5 Strengths and Limitations

Past research has taken a longitudinal approach to examining the relationship between constructs from the SIA and SDT frameworks. Consequently, this study marked the first time that LTA has been applied in the context of the unified approach while also including separate constructs for the regulatory forms of motivation and BPN. Taking this approach, the study findings contributed unique insights into the transient nature of BPN in predicting membership of

specific subgroups in the amateur footballer population.

The decision to include two-time points was a useful addition to observe the time-specific role of BPN and social identification. Although the six-month period covered the amateur football season, the results might not hold beyond the season's end and into the next. Thus, extending this research across multiple seasons would be a logical next step.

Furthermore, the noted disparity in predicting latent profile membership based on initial BPN satisfaction and social identification was unique. However, future research should aim to measure BPN and social identification at multiple time points to determine whether the transient and stable characteristics of the respective constructs would be replicated over time. Consequently, an important advancement for the unified approach would involve extending the observation period when conducting longitudinal research, especially when examining motivational profiles.

Finally, this study was able to further explore the link between relatedness and social identification within the context of a longitudinal person-centred approach. The results showed that each concept uniquely contributed to predicting the subgroup membership of recreational footballers. Additionally, the findings further supported the close relationship and separateness of the two concepts. Yet, these findings provide only an initial understanding, and much more research will be required to fully develop the theoretical links between these factors.

6.5.6 Summary

In this chapter, regulatory forms of motivation provided the basis for identifying underlying subgroups within a sample of amateur and recreational footballers. Motivational profile membership was investigated to understand how membership changed over time influenced by team identification and satisfaction of BPN. Additionally, experiences of burnout and physical health were examined from the perspective of the identified motivational profiles. Overall, this research demonstrated the existence of distinct motivational profiles within recreational football players, which remain largely stable over time. The study found that BPN and social identification have a significant role in predicting specific profile membership. Furthermore, it highlighted the direct link between specific profiles and variations in burnout and physical health outcomes. By employing a longitudinal, person-centred approach, this study emphasised the inherent complexity of motivation, providing valuable insights into both the diversity within a sample and the dynamics over time. These findings offer a foundation for developing targeted interventions to foster positive experiences and outcomes within team-based sports environments.

7 GENERAL DISCUSSION

Although a plethora of empirical research supports the main tenets of both the social identity approach (SIA) and self-determination theory (SDT), the links between the two frameworks have received far less attention. Although several reasons have been put forward to support this decision more recently, there has been greater acceptance from proponents on both sides that a closer alignment might help to advance understanding of motivation in the context of group processes (e.g., Martela et al., 2021; Platow & Grace, 2020).

The current research was entirely grounded within a unified approach that drew from key concepts from the SIA and SDT frameworks. The program of research was designed to accomplish a number of aims: (i) possible relationships between key concepts of the SDT (e.g., relatedness) and SIA (e.g., social identification) frameworks; (ii) the effects of incorporating core concepts of the SDT and SIA on measures of performance and well-being; (iii) the combined effects of support for basic psychological needs (BPN) and social identification; (iv) the longitudinal relationship of the core concepts of SDT and SIA; and (v) within the context of performance-based settings (i.e., workplace, sport). The findings from the three studies have met each of these objectives and have offered support in bringing together the SIA and SDT frameworks into a more unified approach.

This thesis made several significant and novel contributions to advancing the unified approach literature. This thesis: 1) was the first to examine social identification, motivation, and BPN together in an experimental design (Chapter 5) and longitudinal study (Chapter 6); 2) applied the unified approach to two populations that have not yet been explored, workplace employees (Chapter 4) and recreational footballers (Chapter 6); 3) through adopting a person-centered approach, identified distinct subgroups, showing the diversity of motivational and group experiences within a population (Chapters 4 and 6); 4) provided evidence of individuals within a seemingly homogeneous group (e.g., amateur footballers) exhibiting distinct profiles associated with motivation, BPN, and social identity (Chapters 4 and 6); 5) showed that the underlying motivational profiles were not captured by more traditional variable-centered analysis (i.e., structural equation modelling (SEM)) (Chapter 4); 6) showed that motivational profiles have specific characteristics that shift over time, influenced by factors like team identification and the fulfillment of BPN (Chapter 6); 7) demonstrated that satisfaction of BPN and a strong sense of social identity contributed positively to motivational profiles, which in turn were linked to better

performance and health outcomes (Chapters 4, 5, and 6); 8) showed that combined priming effects of BPN and social identification may not have been associated with a boost in performance (Chapter 5); and 9) provided evidence towards better understanding the link between relatedness and social identity processes (Chapters 4, 5, and 6). The remainder of this chapter explores these contributions in further detail, bringing together the findings from the three studies and couched in the previously presented literature.

7.1 Person-Centred and Variable-Centred Perspectives

Person-centred approaches provided a different perspective to more traditional variable-centred analysis (Muthen & Muthen, 2000). Where variable-centred analysis typically provides researchers with information on the relationships between variables through modelling techniques, person-centred approaches offer a method for comparing individuals and placing similar individuals into subgroups and, thus, uncovering heterogeneity in a population (Bates et al., 2013; Muthén & Muthén, 2002). Research from both the SIA or SDT that has utilised person-centred approaches have clearly demonstrated this point (e.g., Martinent & Decret, 2015; Xie et al., 2022). Motivational profiles have developed as a consequence of adopting a person-centred approach and provide a distinct way of presenting individuals' motivational states (e.g., Gustafsson, Carlin, et al., 2018). This approach has also helped in providing empirical evidence for an SDT proposition that individuals can and do experience multiple forms of motivation for a given behaviour (e.g., Chu et al., 2018). This thesis has contributed further evidence in support of this point, in particular findings from Study 3. Yet, the findings go much further than previous research in two important ways.

Studies 1 and 3 presented latent profiles that, for the first time, included factors from the SIA and BPN. The identified latent profiles were also in line with those found in previous studies that have examined motivational and BPN profiles (e.g., Gustafsson, Carlin, et al., 2018; Shannon et al., 2021). Taken together, the findings demonstrated the important role latent profiles should play in furthering our understanding of the underlying motivational and group processes within a unified approach. Furthermore, identifying the conditions and settings where heterogeneity exists would reduce the chances of important contextual details about between-group differences being omitted.

In Study 1, variable- and person-centred analyses clearly demonstrated the contrasting results from using the same data. The variable-centred analysis was largely in keeping with

previous research, demonstrating the mediating influence of BPN between the relationship of social identification and perceived stress (e.g., Neys et al., 2014; Thomas, Amiot, et al., 2017). The modelling approach (i.e., SEM) was beneficial in showing the strength and importance of particular relationships between variables. For instance, within the context of the workplace and, possibly, as a consequence of the restrictions put in place during the pandemic, the frustration of BPN factor was observed to be a significant mediator while the BPN satisfaction factor was not. Additionally, the model revealed a notable covariance between the self-investment factor and the factors of relatedness satisfaction and frustration. This occurred despite the nonfunctional role attributed to the higher-order BPN factors within the model.

By contrast, the results of the latent profile analysis (LPA) identified several underlying subgroups, each defined by a distinct set of scores for the satisfaction and frustration of BPN and social identification in the shape of self-investment. The variable-centred analysis treated the same data as though it was a homogeneous population. The results of the LPA indicated heterogeneity in the population. This meant that profile groups with smaller memberships were subsumed, and their impact would have been negligible compared with latent profiles containing a larger proportion of individuals within the variable-centred analysis. This point was evident from examining the mean scores for each factor. For example, the two largest latent profiles contained approximately two-thirds of the sample. The standardised mean scores for all participants showed that the subscale scores broadly reflected these two largest latent profiles.

The findings from Study 3 provided further support to the importance of adopting a person-centred approach to understanding motivation and group processes. As with Study 1, distinct subgroups were identified and found to be associated with particular well-being outcomes. Moreover, in both studies, the distinct latent profiles were in line with those identified in other research, which indicates the generalisability of latent profile between settings and populations (Grasten et al., 2023; Gustafsson, Carlin, et al., 2018; Martinent & Decret, 2015; Martinent et al., 2021). This has important implications for better understanding how subgroups within different populations might experience different forms of motivation and how these affect group-level processes.

Thus, the findings from Studies 1 and 3 support the wider use of person-centred analysis but, where possible, a mixed or integrative method that provides researchers with the benefits of using both forms of analysis (Muthen & Muthen, 2000). While this mixed method is not a new

approach (e.g., Lindwall et al., 2016; Saward et al., 2024), this thesis remains the only example of applying LPA and SEM in conjunction with the unified approach. In the next section, the discussion considers how motivational and social identity processes have previously been used within analysis. Moreover, the previous literature was considered against the main findings of this thesis.

7.2 The Predictive or Mediating Roles for Basic Psychological Needs and Social Identification

Findings from Study 1 showed that the main components of the SIA and BPN, when combined, provided important information that would otherwise have been unaccounted for if conducting research independently of each framework. However, the results presented in Study 1, concerning the LPA, showed differences that could not be accounted for from the available data. For instance, members of the latent profiles containing the largest number of participants had very similar distribution of mean scores across each of the BPN and self-investment factors. However, these two latent profiles differed regarding reported helplessness and self-efficacy. One latent profile group exhibited the anticipated healthier scores, while the other group's scores were, on average, lower than half of the remaining subgroups.

From a theoretical and empirical perspective, both groups should have been expected to present with scores that were reflective of experiencing healthier well-being outcomes based on their respective BPN and self-investment scores (Greenaway, Cruwys, et al., 2015; Van den Broeck et al., 2008, 2016). This result pointed to unobserved factors that might be able to explain this difference. Time could have been one possibility insomuch that the difference would be accounted for by members transitioning from one profile to another. Previous findings and those from Study 3 do provide support for this proposition (e.g., Emm-Collison et al., 2020; Martinent & Decret, 2015). While, in general, latent profile membership remains stable across time, members can and do transition between different latent profiles (e.g., Cece et al., 2018; Gillet et al., 2017). In addition to the likely transition hypothesis, the regulatory forms of motivation would likely have provided further explanatory powers to differentiate these two latent profiles. The SDT literature would certainly support this claim with more autonomous forms of motivation, facilitated by BPN satisfaction, and leading to experiences of improved well-being (e.g., Adie et al., 2012; Edmunds et al., 2007; Ntoumanis et al., 2021). The findings from Study 2 offer preliminary indications of this relationship with the group that received the combined priming effects of competence support and greater social identification, subsequently reporting the highest degree of BPN satisfaction, and interest and enjoyment, a proxy for intrinsic motivation. Study 3 also contributed towards this

evidence, with the most adaptive motivational profiles associated with better health outcomes.

More broadly, the main concepts from the SIA and SDT frameworks have been more consistently used when investigated separately in the literature. In the context of the SDT framework, the relationship between BPN and various outcomes has most typically been mediated by the range of regulatory types (e.g., Cece et al., 2018; De Francisco et al., 2020; Fransen, Boen, et al., 2018; Fransen, Vansteenkiste, et al., 2018; Ng et al., 2012). However, BPN have also been utilised without the inclusion of the motivational types and under these conditions, their role switches to that of mediator (e.g., Deci et al., 2017; Šakan et al., 2020). Similarly, for the SIA framework, social identification has been used as both the main predictor (e.g., Haslam et al., 2009) and mediator (e.g., Dunstone et al., 2023) for a range of outcomes. Yet, in the context of unified approach research, the roles of predictor and mediator are less well defined (e.g., Amiot et al., 2010; Greenaway, Cruwys, et al., 2015).

The unified approach literature has not taken a consistent approach on whether social identity processes or BPN act to mediate a relationship between the other in predicting an outcome (e.g., Amiot et al., 2010; Greenaway et al., 2017; Sheldon & Bettencourt, 2002). The results from this thesis have demonstrated the importance of determining whether or not the context requires applying the regulatory types of motivation to fully account for the underlying motivational processes. For instance, in investigating domains where motivation would be considered inherently connected to the activities to be scrutinised, such as work or physical exercise. A recent meta-analysis that examined SDT-based interventions in the health domain highlighted the effects of various aspects of the intervention being positively associated with motivational types or BPN support (Ntoumanis et al., 2021). In Study 1, the lack of regulatory types appeared to constrain the insights that could be derived from the results. For example, had regulatory types been measured, this might have provided the quantitative and qualitative information necessary to differentiate the two almost identical latent profiles. The only difference has been in reported levels of self-efficacy and helplessness. Study 2 used a proxy measure for motivation. This provided additional information for discerning, for instance, that the high competence - high team identification (High CM-High TI) group was less likely to be experiencing external pressure because of the higher reported enjoyment and interest. However, had the full range of regulatory types been available this might have offered further insights regarding differences between the experimental groups. Study 3 fully utilised the full continuum of motivational types, using BPN and social identification

as predictors in the latent transition analysis (LTA). Had these predictors not been included in the model then their unique contributions over time would not have been identified and compared.

The results presented in Study 3 highlighted the waning effects of BPN over time. Satisfaction of autonomy, competence, and relatedness demonstrated fewer predictive powers to determine motivational profile membership at follow-up. Differences in autonomy, competence, and relatedness were only predictive at time 1. A similar finding was evidenced in a recent study that examined the regulatory types of BPN longitudinally (Cece et al., 2018). The results showed that the initial degree of autonomy, competence, relatedness, and general BPN satisfaction was predictive of latent group membership at the beginning of the study. At the end of the study, only general BPN frustration was found to predict latent profile membership. These results supported incorporating the regulatory types when drawing on BPN to better identify underlying subgroups. Moreover, the results of Study 3 might have benefited from the inclusion of BPN frustration to predict latent profile membership at the follow-up phase. Previous research has suggested that BPN frustration might better capture the relationship to negative outcomes like burnout (e.g., Chen et al., 2015; Reed-Fitzke & Lucier-Greer, 2021; Van den Broeck et al., 2016). Although this has not always been necessary to observe meaningful results (e.g., Li et al., 2013). This was supported by the findings from Study 1, where each BPN frustration factor was found to be independent of the corresponding BPN satisfaction factor. Additionally, the SEM analysis indicated that BPN frustration mediated the relationship between self-investment and perceived stress.

In contrast to the waning effects of BPN, social identification was found to predict membership of the most adaptive motivational profile at the beginning and end of the study. This novel finding provided clear evidence that supported the rationale for bringing into closer alignment the main concepts from the SIA and SDT frameworks. This has important implications for supporting individuals who might be at the early stages of engaging in, for example, physical activity. Moreover, these findings have also supported the general use of BPN and social identification as predictors within the unified approach. Across each of the three studies in this thesis, BPN were treated as individual factors instead of the alternative approach of aggregating into a composite factor. Yet, within the literature, it has not been uncommon to find the implementation of BPN as a global composite score (e.g., Greenaway et al., 2017; Reed-Fitzke & Lucier-Greer, 2021). The limited scope of the unified approach literature has meant that this thesis represented the first time that BPN satisfaction and frustration of autonomy, competence, and

relatedness were examined as separate components alongside social identification (Study 1). Previous meta-analytic findings have strongly argued against aggregating the BPN into a composite score because, although they are highly correlated, this relationship has not been found to be excessive to suggest item redundancy (Van den Broeck et al., 2016).

Study 1 showed that small differences between corresponding BPN satisfaction and frustration subscales identified qualitative differences between groups that would have been missed without measurement of the frustration scale. For example, while three latent profile groups showed similar levels of relatedness satisfaction, one group reported significantly lower levels across the centrality and satisfaction (self-investment) subscales, as well as nonsignificantly lower reported relatedness frustration. The waning effects of BPN satisfaction factors in Study 3 were further evidence of the importance of including BPN frustration, emphasised by findings from a similar study where general BPN frustration was more predictive at the end of the study while the effects of BPN satisfaction had waned (Cece et al., 2018).

Previous research has also demonstrated that asymmetry can exist in the satisfaction of particular BPN, for example, below average scores in autonomy satisfaction with above average scores in competence and relatedness satisfaction (Chevrier & Lannegrand, 2022; Rouse et al., 2020; Santana-Monagas & Núñez, 2022). The results presented in each study have also supported this proposition in cross-sectional, longitudinal, and experimental designs. Similarly to the earlier point on the importance of regulatory types in affording additional explanatory powers, the same is true of examining BPN as individual factors. For example, without the individual scores provided by the BPN the differences between some of the groups in Study 3 would have been left unexplained.

In contrast, social identification was not found to substantially differentiate between latent groups based on values of the self-investment factors in Study 1. Rather, in the case of the self-investment scale, it would have been entirely plausible to aggregate the components into a global score and obtain similar results. Research into measurements of social identification has indicated that often a single-item measure is sufficient for distinguishing differences between samples, and the results from Studies 1 and 2 support this point (Postmes et al., 2013). These findings underpinned the rationale for treating the self-investment variable in global terms within the longitudinal study. The decision to use a global score for team identification does not appear to have limited the overall findings, evidenced by this factor being found to be significant in predicting latent profile membership at both time points.

7.3 Basic Psychological Needs, Motivation, and Social Identification

The regulatory types of motivation are an important factor in creating a more rounded and complete unified approach. Thus far, the roles of BPN and social identification have been stated. Still, this has presented only a partial understanding of the motivational and group processes that determine group behaviour. Findings from this thesis and the wider literature have provided supporting evidence for using the three BPN as individual factors and, arguably, into satisfaction and frustration, rather than as a unitary construct (e.g., Deci et al., 2017; Van den Broeck et al., 2016). Conversely, evidence from this thesis and elsewhere has supported the use of social identification as a unitary construct being sufficient in most cases (Postmes et al., 2013). This approach was successfully adopted in the final experimental study with great success.

Across each of the studies, the cumulative evidence was highly supportive of including the most granular breakdown of motivation in the form of the regulatory types, where possible, for any given study. In Study 1 there was insufficient data to explain the difference between two latent groups that differed only in the scores members reported for perceived stress. It was hypothesised that including the regulatory types would have likely provided the additional data to differentiate these two groups. Subsequently, Study 2 included a proxy measure of intrinsic motivation, the enjoyment and interest subscale. Whilst inclusion of the proxy measure helped differentiate between the control group and the High CM-High TI group, the robustness of this evidence was limited because baseline measures were not included in this study. However, the final study introduced the full breadth of regulatory types. This proved an important step, especially as it was the first time a study had brought together measures of autonomy, competence, relatedness, the full range of regulatory types, and social identification. Furthermore, this thesis also marks the first time these factors will have been examined longitudinally.

When used to identify motivational profiles, the regulatory types are arguably easier to interpret and contextualise regarding behavioural outcomes. For instance, it could be argued that the motivational profiles identified in Study 3 translated more readily to explaining subsequent behaviours than those identified in Study 2. This might be related to the notion that the qualitative difference between the regulatory types have been described within the SDT framework, thereby facilitating their greater interpretability when used in motivational profiles. Moreover, the LPA literature has provided a great deal of evidence to support several commonly identified profiles, which suggested that the motivational profiles also had greater generalisability across a

range of settings (e.g., Gustafsson, Carlin, et al., 2018; Saward et al., 2024). For instance, an excellent example is the controlled motivational profile type that has been commonly identified in LPA studies and presents a uniquely distinct profile that can have varying outcomes (e.g., Parker et al., 2021). Subsequently, the greater interpretability also lends itself to the resultant motivational profiles being more generalisable to other domains outside of simply performance-based settings.

BPN and social identification are arguably better suited as predictors to regulatory types of motivation when adopting a person-centred approach (e.g., Cece et al., 2018; Saward et al., 2024). In Study 1, two latent profiles were indistinguishable in terms of the degree of each BPN satisfaction and frustration factors, and self-investment factors, except the reported levels of helplessness and self-efficacy. This difference in perceived stress factors was argued to show the limitations of latent profiles restricted to BPN and social identification. Moreover, it was hypothesised that unknown factors, most likely the regulatory types of motivation, were the missing link in explaining the difference between the two latent profiles.

The results of Study 3 provided support to the hypothesis that the regulatory types of motivation would better account for health outcomes than BPN and social identification in Study 1. Within the unified approach, BPN and social identification might better serve the approach when used as predictors of the regulatory types of motivation. In the context of Study 3, the BPN were seen to have a transient role compared with social identification. This was hypothesised to be because BPN was context-dependent and more likely to have fluctuated over time (Cece et al., 2018), although empirical evidence has suggested otherwise (e.g., Gillet et al., 2019; Huyghebaert-Zouaghi et al., 2022). Thus, as was observed in Studies 2 and 3, the inclusion of some measure of motivation, whether this is a unitary or a multi-factorial conceptualisation, the unified approach was vastly improved.

7.4 Relatedness and Social Identification

The findings from each study have provided preliminary support for the interplay between relatedness and social identification. It had been suggested that the SIA could help to extend the SDT framework to better accommodate group processes, especially when dealing with larger groups, such as within organisations (Martela et al., 2021). This thesis provided only tentative support to this proposition, primarily because two studies dealt with much smaller groups.

Across each study, social identification was found to be moderately to strongly correlated with relatedness. Both were also found to have differing correlations among the factors examined

across each study. For instance, in Study 3, social identification was more strongly and negatively correlated with amotivation, devaluation, and emotional exhaustion, while relatedness had marginally stronger positive and negative correlations to autonomous and controlled forms of regulation, respectively. Similarly, in Study 1, relatedness satisfaction and frustration were moderately to strongly associated with each self-investment factor. The BPN frustration scales were more strongly correlated to the helplessness subscale of the perceived stress scale, which was accounted for because they reflected the negative outcomes (e.g., Rouse et al., 2020; Santana-Monagas & Núñez, 2022). Furthermore, the correlations between relatedness satisfaction and each self-investment factor were substantially greater than the corresponding correlations with autonomy and competence. Interestingly, this only occurred in Study 1 and the correlations in Studies 2 and 3 were broadly the same and in line with previous research (e.g., Amiot et al., 2010; Thomas, Amiot, et al., 2017). A substantial difference with Study 1 was that participants were selected from medium to large organisations, and might explain the stronger correlations between relatedness and the self-investment factors. Overall, the bivariate correlations emphasised both the separateness of relatedness to autonomy and competence, and also social identification.

In the variable-centred approach in Study 1, the subscales for relatedness satisfaction and frustration were made to covary with the second-order factor of self-investment, and both relationships were found to be significant. While relatedness satisfaction had the strongest covariance to self-investment, it was relatedness frustration that had the most impact on the overall model. However, the difference in covariance suggested that relatedness satisfaction was more closely associated with the self-investment factor, likely because both are focused on positive aspects of group life.

Studies 1 and 3 provided further evidence for relatedness and social identification acting independently of each other. In Study 1, despite the shared trends among certain latent profiles in relatedness and competence, divergences appeared in the degrees of social identification. For instance, the subgroups who, broadly, reported the highest satisfaction and lowest frustration of relatedness were not associated with the groups that identified most strongly with their workgroups. In Study 3, individuals who experienced their behaviour as self-determined were predicted by relatedness and social identification, as well as the other two BPN. Yet, greater degrees of relatedness and competence were important in predicting who would likely experience their behaviour as more controlled. In line with these results, research from the unified approach

literature has broadly found that self-determined behaviour was associated with greater social identification (Neys et al., 2014; Ntoumanis et al., 2018). More specifically, relatedness was found to be less influential in predicting persistence (Neys et al., 2014).

Findings from outside of the unified approach literature have also broadly supported the notion that greater social identification leads to group members being more motivated (e.g., Beauchamp et al., 2018; Slater et al., 2018). This has been argued to be because identifying with a group facilitates previously extrinsic behaviours to being experienced as intrinsically motivated (Greenaway et al., 2020). The role of relatedness had been considered less vital for directly facilitating intrinsic motivation but driving an individual's willingness to endorse values and behavioural regulations held by social agents (Deci & Ryan, 2000; Ryan & Deci, 2000c). This helps to promote a sense of belongingness with significant others. While this has not been consistently supported in the literature (Calvo et al., 2010; Ntoumanis, 2001; Standage et al., 2003; Xiang et al., 2016), this study would partially support this proposition and be broadly in line with previous research (Neys et al., 2014).

Thus, across Studies 1 and 3, relatedness and social identification were observed to make unique contributions. There have been calls for a more thorough examination of the relationship between BPN and social identification (Reinboth & Duda, 2006), and, more specifically, the connection between relatedness and social identification (Martela et al., 2021; Reinboth & Duda, 2006). Within this thesis, relatedness and social identification were hypothesised to complement each other by assessing various aspects of group processes, a notion that has been previously proposed by others. There was partial support for the notion that relatedness and social identification assessed different aspects of group processes. Each factor was found to have different effects in each study. This was evident in the waning and sustained effects of relatedness and social identification, respectively, in determining latent profile membership over time.

However, the design of each study has meant that many of the notable findings are correlational or cross-sectional and lack the ability to form causal links between the two factors. Overall, the results from this study have provided initial support to the notion that relatedness and social identification are dynamically linked but independent factors and are likely to assess different features of group processes.

7.5 Practical Implications

The literature on the SIA and SDT is vast and continually growing. Yet, had this thesis chosen to focus on only one framework, several key findings would have been unintentionally omitted. This raises two significant challenges. The first is that without wider adoption of some or all of the key concepts constituting a unified approach, research will continue to suffer from omissions. SIA proponents should more formally consider the conceptualisation of motivation within the framework and not presume the existence of a universally accepted definition when conducting research (e.g., De Cuyper et al., 2016; Di Bernardo et al., 2021; Stevens et al., 2023). Similarly, the SDT framework would benefit greatly from adopting concepts from the SIA to better understand the possible transient effects of BPN and how this interacts with more stable social identity (e.g., Martela et al., 2021). Second, until the key components of a unified approach are more widely considered, the theoretical underpinnings of each framework are likely to be less robust because of these shortcomings. This has serious implications for those involved in translating this evidence into effective interventions to support groups with, for example, improving health and performance outcomes. Thus, it is incredibly important that future research from proponents of the SIA and SDT give consideration to adopting a unified approach for the primary aim of advancing this area of inquiry.

This thesis set out to strengthen the current evidence base for the unified approach, grounded in the SIA and SDT frameworks. In doing so, a primary aim was to make a significant theoretical and empirical contribution to this underdeveloped area of research as it has the potential to support the advancement of psychological understanding of group processes and motivation. Given that the current evidence base for both the SIA and SDT frameworks are extensively used as the backbone of numerous intervention studies, any improvements offered by this under-researched area can help to improve the effectiveness of future interventions. The widely accepted proposition that there are likely to be very few, if any, examples where social identity does not apply in the real world is not being denied. Yet, it could also be argued that there are likely to be very few, if any, situations that involve behaviour, either directly or indirectly, where motivation does not apply. More specifically, where motivation is concerned, then the SDT framework offers the most robust and supported means of conceptualising this factor.

Across three studies, this thesis has presented results with and without a measure of motivation and also the full motivation continuum. Where no measure was included in the studies

contained in this thesis, there was evidence of final conclusions being less robust. This was especially evident when contrasted against the findings that were able to draw on motivation. These different methods highlighted that a single measure of motivation should be the minimum standard that studies should employ when investigating the core components of SDT and SIA. This offers greater flexibility and opportunity to identify differences, which is especially important when conducting person-centred analysis. Yet, wherever possible, including the full range of regulatory types of motivation enables a hugely improved level of granularity that is, for obvious reasons, not available when using a single or global measure of motivation. Creating a consistent framework to support future unified research approaches will simplify direct comparisons between studies and enhance the generalisability of results.

Closely linked to the above recommendation is the use of person-centred analysis, which was a pivotal method used in this thesis and facilitated many of the significant contributions put forward in this thesis. Rather than relying on variable-centred methods that can often treat the population as a singular and homogeneous group, this thesis was able to show the heterogeneity that readily exists in society. The approach provides a method for identifying distinct subgroups that comprise the population of interest. This does not mean that the findings from the variable-centred analysis are somehow diminished but rather that the two approaches offer researchers different tools for examining populations of interest. Previous studies and the findings from this thesis support the use of person-centred analysis, especially when the regulatory types of motivation are concerned (e.g., Saward et al., 2024). Under these conditions, the method complements the regulatory types of motivation by identifying commonly found motivational profiles. Moreover, rather than advocating for one method over another, the findings from this thesis strongly support a mixed-method approach to researching groups. Adopting person- and variable-centred approaches performed side-by-side provides both opportunities to answer questions on the relationship between variables and identify whether heterogeneity exists in a sample.

For those working closely with groups (e.g., workplace managers, coaches, health leaders) to facilitate behaviour change, evidence from either framework might likely have formed the basis for devising effective interventions. However, findings from this thesis and the unified literature would strongly encourage such leaders to consider the benefits of evaluating groups through a unified lens to ensure interventions are targeted effectively on aspects of the group that will harness the best results. Furthermore, leaders must also be open to and sensitive to the notion that within

their working environment, there might be multiple subgroups that exist, and any interventions need to take into account the differences that will inevitably be present. However, the initial findings from this thesis in terms of devising interventions that are attuned to both social identity and motivational processes simultaneously should be done with caution. This is because the results of manipulating both group and motivational processes led to poorer performance on a choice reaction task, albeit that this was on a reaction time task. Rather, interventions should be tailored to focus on one aspect of group or motivational processes at any given time.

The temporal nature of both social identity and motivational processes should also factor into working with groups. The influence of BPN was found to be far more transient when compared with the stability of social identification over time. Thus, where social identification might be a useful measure to determine who is likely to be a member of a more adaptive group over the longer term, BPN provides a snapshot of how an individual is experiencing their social environment at a point in time. This information can be invaluable in creating support for BPN satisfaction targeted to a specific basic psychological need. This is especially important for motivational profiles that present with high degrees of autonomous and controlled motivation. Where previous research has suggested that such subgroups have been protected from experiencing the adverse effects of high degrees of controlled motivation, the current thesis did not find support for this notion. Therefore, it would be conducive to closely monitor individuals who present as members of this particular motivational profile, as they are likely to benefit most from interventions targeting specific BPN.

At the initial stages of group formation, be that a newly formed group with no history or a group reforming after a period apart, assessing and monitoring BPN should be considered. Satisfaction of BPN were found to be most relevant at the initial stages of a football season, with the predictive effects waning later in the season. This finding concurs with the only other study to consider BPN and regulatory types over a period of time (Cece et al., 2018). The degree of initial social identification is important in identifying those likely to be members of the most adaptive groups. However, BPN can help to identify membership of other less adaptive groups, although it is important to note that the window for doing so might be relatively small. Thus, if BPN are to be used in the context of assessing new groups and their members, then this should be done at the earliest opportunity.

7.6 Limitations and Future Directions

There are some limitations and ideas for future research presented in this section. In this thesis, a range of methods were used to explore the unified approach, bringing together the SIA and SDT frameworks, including cross-sectional, longitudinal, and experimental designs. The samples for each study were taken from Prolific, a platform for sourcing research participants. This meant that while participants were selected from specific pools of participants, such as those in Study 1 who were employees working in teams of more than 10 people, this did mean that participants were unrelated. Future research should aim to replicate the findings from, specifically, the longitudinal analysis with related individuals. Analysing a large and singular organisation, such as a corporation, would offer the opportunity to determine whether the heterogeneity identified in the populations examined in this thesis also exist within larger social structures or vary across organisations.

Motivation is a key determinant of behavioural intention. However, in each person-centred study, there was the assumption that self-reported motivation levels equate to actual behavioural engagement. In each of these studies, health outcomes were the primary concern. Although performance was directly measured in one study, this was in relation to a rather choice reaction task and was also not then associated with the regulatory types of motivation. In Study 3, it was unclear how often individuals actually played football to know the link between motivation, BPN, social identification, and subsequent behaviour. Assessing the level of engagement would help clarify whether certain types of individuals, such as an individual who sporadically attends practice over the course of a season, are more likely to be associated with specific motivational profiles and also whether this is connected with profile stability. Additionally, future research could focus on more performance-type outcomes, which would also act to confirm that self-reported motivational profiles align with a group or individual's performance over time.

The finding that the influence of initial levels of BPN were transient compared with the stability of initial social identification requires further examination. First, it is important to determine whether this finding translates to other populations. Second, the longitudinal design was only over two time points and it is necessary to conduct this type of analysis over much longer periods of time. Although time-consuming and expensive, research that follows athletes over several seasons and assesses the components of the SIA and SDT frameworks multiple times during each season could help develop our understanding of the fluctuating nature of BPN.

Satisfaction of BPN was primarily examined in this thesis. However, the first study also

examined the frustration of BPN, although this did not add substantially to differentiating between latent groups any more than the satisfaction of BPN alone. However, BPN frustration was found to be a significant mediator in predicting perceived stress, suggesting the importance of assessing frustration when outcomes are negative. Furthermore, while initial levels of BPN satisfaction were influential in Study 3, BPN frustration might become more important over time, as indicated in previous research. Therefore, the role of BPN frustration is an area of research that warrants additional exploration as part of the unified approach.

The findings from the experimental study would suggest that attempting to affect changes in group and motivational processes simultaneously could lead to adverse effects. Thus, it is unclear, at this time, whether interventions that focus on both frameworks can have the desired positive effects. While the initial results from this thesis were unexpected, they do indicate that any intervention should be carefully considered to ensure that it focuses on changing one aspect of the group at a time. Further research is required to ascertain whether there are benefits to focusing interventions on both social identity and motivational processes simultaneously or sequentially.

7.7 Summary and Conclusion

In this final chapter, the most important findings from the thesis have been outlined and discussed. Together, the findings supported the unified approach to studying motivational and group processes in the context of health and performance outcomes. Traditionally studied separately, the thesis demonstrated the inherent value of a unified approach in several important ways. The current research was the first to examine the unified approach by examining social identification, BPN, and regulatory types of motivation together in a set of cross-sectional, experimental, and longitudinal studies.

Person-centred approaches also demonstrated the heterogeneity that existed within populations that more traditional variable-centres approaches can often mask. The roles of social identification and BPN were found to differ in terms of determining the type of motivational profile an individual was likely to endorse and also what that meant for future motivational profile membership. The distinct profiles provide a nuanced understanding that could be helpful for tailoring interventions in group settings. Additionally, BPN were found to have a transient effect, whereas social identification was found to be more stable over time in shaping autonomous motivation and behaviour.

This thesis also demonstrated the inherent benefits of including the motivational

continuum, which significantly enhanced the explanatory power of the unified framework when used alongside each BPN and social identification. This research was also the first to attempt an experimental design that manipulated both social identity and BPN in the same study. This combined priming effect hindered rather than boosting performance as was observed when either BPN or social identification were primed separately.

Collectively, these findings offer fresh support for the unified approach and underscore the significance of considering social identity and motivational processes when examining group outcomes. Broadening the adoption of this approach and applying it to additional domains could greatly enhance future research and the development of suitable and effective methods for group engagement.

8 REFERENCES

Abrams, D., & Hogg, M. A. (2004). Metatheory: Lessons from social identity research. *Personality and Social Psychology Review*, *8*, 98–106. https://doi.org/10.1207/s15327957pspr0802_2

Adie, J. W., Duda, J. L., & Ntoumanis, N. (2012). Perceived coach-autonomy support, basic need satisfaction and the well- and ill-being of elite youth soccer players: A longitudinal investigation. *Psychology of Sport and Exercise*, *13*, 51–59. https://doi.org/10.1016/j.psychsport.2011.07.008

Aelterman, N., Vansteenkiste, M., Van Keer, H., & Haerens, L. (2016). Changing teachers' beliefs regarding autonomy support and structure: The role of experienced psychological need satisfaction in teacher training. *Psychology of Sport and Exercise*, *23*, 64–72. https://doi.org/10.1016/j.psychsport.2015.10.007

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*, 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Albarello, F., Crocetti, E., & Rubini, M. (2018). I and Us: A Longitudinal Study on the Interplay of Personal and Social Identity in Adolescence. *Journal of Youth and Adolescence*, *47*, 689–702. https://doi.org/10.1007/s10964-017-0791-4

Alboukadel, K. (2023). rstatix 0.7.2.

Alvarez, M. S., Balaguer, I., Castillo, I., & Duda, J. L. (2009). Coach autonomy support and quality of sport engagement in young soccer players. *The Spanish Journal of Psychology*, *12*, 138–148. https://doi.org/10.1017/s1138741600001554

Amiot, C. E., & Aubin, R. M. (2013). Why and how are you attached to your social group? Investigating different forms of social identification. *The British Journal of Social Psychology*, *52*, 563–586. https://doi.org/10.1111/bjso.12004

Amiot, C. E., Blanchard, C. M., & Gaudreau, P. (2008). The self in change: A longitudinal investigation of coping and self-determination processes. *Self and Identity*, *7*, 204–224. https://doi.org/10.1080/15298860701580793

Amiot, C. E., Lizzio-Wilson, M., Thomas, E. F., & Louis, W. R. (2020). Bringing together humanistic and intergroup perspectives to build a model of internalisation of normative social harmdoing. *European Journal of Social Psychology*, *50*, 485–504. https://doi.org/10.1002/ejsp.2659

Amiot, C. E., & Sansfacon, S. (2011). Motivations to identify with social groups: A look at their positive and negative consequences. *Group Dynamics: Theory, Research, and Practice*, *15*, 105–127. https://doi.org/10.1037/a0023158

Amiot, C. E., Sansfacon, S., & Louis, W. R. (2014). How normative and social identification processes predict self-determination to engage in derogatory behaviours against outgroup hockey fans. *European Journal of Social Psychology*, *44*, 216–230. https://doi.org/10.1002/ejsp.2006

Amiot, C. E., Sansfacon, S., Louis, W. R., & Yelle, M. (2012). Can intergroup behaviors be emitted out of self-determined reasons? Testing the role of group norms and behavioral congruence in the internalization of discrimination and parity behaviors. *Personality and Social Psychology Bulletin*, *38*, 63–76. https://doi.org/10.1177/0146167211429804

Amiot, C. E., Sansfaçon, S., & Louis, W. R. (2013). Investigating the motivations underlying harmful social behaviors and the motivational nature of social norms. *Journal of Applied Social Psychology*, *43*, 2146–2157. https://doi.org/10.1111/jasp.12167

Amiot, C. E., Terry, D. J., Wirawan, D., & Grice, T. A. (2010). Changes in social identities over time: the role of coping and adaptation processes. *The British Journal of Social Psychology*, *49*, 803–826. https://doi.org/10.1348/014466609X480624

Amorose, A., & Horn, T. (2000). Intrinsic motivation: Relationships with collegiate athletes' gender, scholarship status, and perceptions of their coaches' behavior. *Journal of Sport and Exercise Psychology*, *22*, 63–84. https://doi.org/10.1123/JSEP.22.1.63

Anderson, B. A., & Yantis, S. (2012). Value-driven attentional and oculomotor capture during goal-directed, unconstrained viewing. *Attention, Perception and Psychophysics*, *74*, 1644–1653. https://doi.org/10.3758/s13414-012-0348-2

Ashmore, R. D., Deaux, K., & McLaughlin-Volpe, T. (2004). An organizing framework for collective identity: articulation and significance of multidimensionality. *Psychological Bulletin*, *130*, 80–114. https://doi.org/10.1037/0033-2909.130.1.80

Avanzi, L., Fraccaroli, F., Castelli, L., Marcionetti, J., Crescentini, A., Balducci, C., & van Dick, R. (2018). How to mobilize social support against workload and burnout: The role of organizational identification. *Teaching and Teacher Education*, *69*, 154–167. https://doi.org/10.1016/j.tate.2017.10.001

Bailis, D. S., Chipperfield, J. G., & Helgason, T. R. (2008). Collective self-esteem and the onset of chronic conditions and reduced activity in a longitudinal study of aging. *Social Science and Medicine*, *66*, 1817–1827. https://doi.org/10.1016/j.socscimed.2007.12.028

Bandura, A. (2001). Social cognitive theory: an agentic perspective. *Annual Review of Psychology*, *52*, 1–26. https://doi.org/10.1146/annurev.psych.52.1.1

Bartholomew, K. J., Ntoumanis, N., Ryan, R. M., Bosch, J. A., & Thøgersen-Ntoumani, C. (2011). Self-determination theory and diminished functioning: the role of interpersonal control and psychological need thwarting. *Personality & Social Psychology Bulletin*, *37*, 1459–1473. https://doi.org/10.1177/0146167211413125

Bates, M. E., Buckman, J. F., Voelbel, G. T., Eddie, D., & Freeman, J. (2013). The mean and the individual: integrating variable-centered and person-centered analyses of cognitive recovery in patients with substance use disorders. *Frontiers in Psychiatry*, *4*, 177. https://doi.org/10.3389/fpsyt.2013.00177

Bauer, J. (2022). A Primer to Latent Profile and Latent Class Analysis. In M. Goller, E. Kyndt, S. Paloniemi, & C. Damşa (Eds.), *Methods for Researching Professional Learning and Development: Challenges, Applications and Empirical Illustrations* (pp. 243–268). Springer International Publishing. https://doi.org/10.1007/978-3-031-08518-5_11

Baumeister, R. F., & Leary, M. R. (1995). The need to belong: desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, *117*, 497–529.

Baumeister, R. F., Ainsworth, S. E., & Vohs, K. D. (2016). Are groups more or less than the sum of their members? The moderating role of individual identification. *The Behavioral and Brain Sciences*, *39*, e137. https://doi.org/10.1017/S0140525X15000618

Beauchamp, M. R., & O'Rourke, J. (2020). Group-based physical activity participation. In S. A. Haslam, K. Fransen, & F. Boen (Eds.), *The New Psychology of Sport and Exercise* (pp. 187–205). Sage.

Beauchamp, M., Dunlop, W. L., Downey, S. M., & Estabrooks, P. A. (2012). First impressions count: perceptions of surface-level and deep-level similarity within postnatal exercise classes and implications for program adherence. *Journal of Health Psychology*, *17*, 68–76. https://doi.org/10.1177/1359105311408156

Beauchamp, M. R., Carron, A. V., McCutcheon, S., & Harper, O. (2007). Older adults' preferences for exercising alone versus in groups: Considering contextual congruence. *Annals of Behavioral Medicine*, *33*, 200–206. https://doi.org/10.1080/08836610701310037

Beauchamp, M. R., Harden, S. M., Wolf, S. A., Rhodes, R. E., Liu, Y., Dunlop, W. L., Schmader, T., Sheel, A. W., Zumbo, B. D., & Estabrooks, P. A. (2015). GrOup based physical Activity for oLder adults (GOAL) randomized controlled trial: study protocol. *BMC Public Health*, *15*, 592. https://doi.org/10.1186/s12889-015-1909-9

Beauchamp, M. R., Ruissen, G. R., Dunlop, W. L., Estabrooks, P. A., Harden, S. M., Wolf, S. A., Liu, Y., Schmader, T., Puterman, E., Sheel, A. W., & Rhodes, R. E. (2018). Group-based physical activity for older adults (GOAL) randomized controlled trial: Exercise adherence outcomes. *Health Psychology*, *37*, 451–461. https://doi.org/10.1037/hea0000615

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238–246. https://doi.org/10.1037/0033-2909.107.2.238

Bentley, S. V., Young, T., Alvarez, B., Jetten, J., Haslam, C., Cruwys, T., Casara, B. G. S., Crimston, C. R., Dare, M., Ionescu, O., Krug, H., Selvanathan, H. P., Tanjitpiyanond, P., Steffens, N. K., Wang, Z., & Wibisono, S. (2022). Double jeopardy: How lower levels of support during COVID-19 exacerbated the relationship between loneliness and distress. *Frontiers in Public Health*, *10*, 976443. https://doi.org/10.3389/fpubh.2022.976443

Berntsen, H., Ivarsson, A., & Kristiansen, E. (2019). Need-supportiveness and athlete well-being: Coaches' competence-support at risk in the elite sport context throughout the season. *Current Issues in Sport Science (CISS)*. https://doi.org/10.15203/ciss_2019.010

Bettencourt, B. A., & Sheldon, K. (2001). Social roles as mechanisms for psychological need satisfaction within social groups. *Journal of Personality and Social Psychology*, *81*, 1131–1143.

Billig, M., & Tajfel, H. (1973). Social categorization and similarity in intergroup behaviour. *European Journal of Social Psychology*, *3*, 27–52. https://doi.org/10.1002/ejsp.2420030103

Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science Education*, *84*, 740–756. https://doi.org/10.1002/1098-237x(200011)84:6<740::aid-sce4>3.0.co;2-3

Bliuc, A.-M., Ellis, R. A., Goodyear, P., & Hendres, D. M. (2011). The role of social identification as university student in learning: Relationships between students' social identity, approaches to learning, and academic achievement. *Educational Psychology Review*, *31*, 559–574. https://doi.org/10.1080/01443410.2011.585948

Branscombe, N. R., Schmitt, M. T., & Harvey, R. D. (1999). Perceiving Pervasive Discrimination Among African Americans: Implications for Group Identification and Well-Being. *Journal of Personality and Social Psychology*, *77*, 135–149. https://doi.org/10.1037/0022-3514.77.1.135

Brewer, M. B. (1991). The Social Self: On Being the Same and Different at the Same Time. *Personality and Social Psychology Bulletin*, *17*, 475–482. https://doi.org/10.1177/0146167291175001

Brown, R. (2020). The social identity approach: Appraising the Tajfellian legacy. *The British Journal of Social Psychology*, *59*, 5–25. https://doi.org/10.1111/bjso.12349

Brown, T. A. (2015). *Confirmatory Factor Analysis for Applied Research* (2nd ed.). Guilford Publications.

Bruner, M. W., McLaren, C., Swann, C., Schweickle, M. J., Miller, A., Benson, A., Gardner, L. A., Sutcliffe, J., & Vella, S. A. (2020). Exploring the Relations Between Social Support and Social Identity in Adolescent Male Athletes. *Research Quarterly for Exercise and Sport*, *92*, 566–572. https://doi.org/10.1080/02701367.2020.1737629

Bruner, M. W., McLaren, C. D., Mertens, N., Steffens, N. K., Boen, F., McKenzie, L., Haslam, S. A., & Fransen, K. (2022). Identity leadership and social identification within sport teams over a season: A social network analysis. *Psychology of Sport and Exercise*, *59*, 102106. https://doi.org/10.1016/j.psychsport.2021.102106

Bunn, C., Palmer, V., Chng, N. R., Andersen, E., Gray, C. M., Hunt, K., Jelsma, J. G. M., Morgan, H., der Sanden, M. N.-v., Pereira, H. V., Philpott, M., Roberts, G. C., Rooksby, J., Roynesdal, O. B., Silva, M. N., Sorensen, M., Teixeira, P. J., van Achterberg, T., van de Glind, I., … Wyke, S. (2023). How European Fans in Training (EuroFIT), a lifestyle change program for men delivered in football clubs, achieved its effect: a mixed methods process evaluation embedded in a randomised controlled trial. *BMC Public Health*, *23*, 526. https://doi.org/10.1186/s12889-023-15419-y

Bureau, J. S., Howard, J. L., Chong, J. X. Y., & Guay, F. (2022). Pathways to Student Motivation: A Meta-Analysis of Antecedents of Autonomous and Controlled Motivations. *Review of Educational Research*, *92*, 46–72. https://doi.org/10.3102/00346543211042426

Burnette, C. B., Luzier, J. L., Bennett, B. L., Weisenmuller, C. M., Kerr, P., Martin, S., Keener, J., & Calderwood, L. (2022). Concerns and recommendations for using Amazon MTurk for eating disorder research. *The International Journal of Eating Disorders*, *55*, 263–272. https://doi.org/10.1002/eat.23614

Cahyono, T., Hartono, F. V., Gani, R. A., Ahmedov, F., Sliz, M., Lobo, J., Kurtoğlu, A., Nasurudin, E., Tannoubi, A., Raman, A., et al. (2023). Coach leadership style, coach-athlete relationships and engagement in team sports: The mediating role of athlete burnout. *Ibero-American Journal of Exercise and Sports Psychology*, *18*, 687–692.

Calvo, T. G., Cervelló, E., Jiménez, R., Iglesias, D., & Moreno Murcia, J. A. (2010). Using self-determination theory to explain sport persistence and dropout in adolescent athletes. *The Spanish Journal of Psychology*, *13*, 677–684. https://doi.org/10.1017/s1138741600002341

Campo, M., Mackie, D., Champely, S., Lacassagne, M.-F., Pellet, J., & Louvet, B. (2019). Athletes' Social Identities: Their Influence on Precompetitive Group-Based Emotions. *Journal of Sport and Exercise Psychology*, *41*, 380–385. https://doi.org/10.1123/jsep.2018-0282

Campo, M., Martinent, G., Pellet, J., Boulanger, J., Louvet, B., & Nicolas, M. (2018). Emotion–performance relationships in team sport: The role of personal and social identities. *International Journal of Sports Science and Coaching*, *13*, 629–635. https://doi.org/10.1177/1747954118785256

Carron, A. V., Widmeyer, W. N., & Brawley, L. R. (1985). The development of an instrument to assess cohesion in sport teams: The Group Environment Questionnaire. *Journal of Sport and Exercise Psychology*, *7*, 244–266.

Cece, V., Lienhart, N., Nicaise, V., Guillet-Descas, E., & Martinent, G. (2018). Longitudinal sport motivation among young athletes in intensive training settings: The role of basic psychological needs satisfaction and thwarting in the profiles of motivation. *Journal of Sport and Exercise Psychology*, *40*, 1–10. https://doi.org/10.1123/jsep.2017-0195

Cerasoli, C. P., Nicklin, J. M., & Ford, M. T. (2014). Intrinsic motivation and extrinsic incentives jointly predict performance: a 40-year meta-analysis. *Psychological Bulletin*, *140*, 980–1008. https://doi.org/10.1037/a0035661

Cerasoli, C. P., Nicklin, J. M., & Nassrelgrgawi, A. S. (2016). Performance, incentives, and needs for autonomy, competence, and relatedness: a meta-analysis. *Motivation and Emotion*, *40*, 781–813. https://doi.org/10.1007/s11031-016-9578-2

Chatzisarantis, N. L. D., Hagger, M. S., Wang, C. K. J., & Thøgersen-Ntoumani, C. (2009). The effects of social identity and perceived autonomy support on health behaviour within the theory of planned behaviour. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, *28*, 55–68. https://doi.org/10.1007/s12144-009-9043-4

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Van der Kaap-Deeder, J., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K. M., Soenens, B., Van Petegem, S., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, *39*, 216–236. https://doi.org/10.1007/s11031-014-9450-1

Chen, F., Curran, P. J., Bollen, K. A., Kirby, J., & Paxton, P. (2008). An empirical evaluation of the use of fixed cutoff points in RMSEA test statistic in Structural Equation Models. *Sociological Methods & Research*, *36*, 462–494. https://doi.org/10.1177/0049124108314720

Chevrier, B., & Lannegrand, L. (2022). The relationship between academic motivation and basic psychological needs within the freshman year context: a longitudinal person-oriented approach. *European Journal of Psychology of Education*, *37*, 921–947. https://doi.org/10.1007/s10212-021-00569-7

Chirkov, V., Ryan, R. M., Kim, Y., & Kaplan, U. (2003). Differentiating autonomy from individualism and independence: a self-determination theory perspective on internalization of cultural orientations and well-being. *Journal of Personality and Social Psychology*, *84*, 97–110. https://doi.org/10.1037/0022-3514.84.1.97

Choi, E. U., & Hogg, M. A. (2020). Self-uncertainty and group identification: A meta-analysis. *Group Processes and Intergroup Relations*, *23*, 483–501. https://doi.org/10.1177/1368430219846990

Chu, T. L. A., Zhang, T., & Hung, T.-M. (2018). Motivational profiles in table tennis players: Relations with performance anxiety and subjective vitality. *Journal of Sports Sciences*, *36*, 2738–2750. https://doi.org/10.1080/02640414.2018.1488517

Cid, L., Monteiro, D., Teixeira, D. S., Evmenenko, A., Andrade, A., Bento, T., Vitorino, A., Couto, N., & Rodrigues, F. (2022). Assessment in Sport and Exercise Psychology: Considerations and Recommendations for Translation and Validation of Questionnaires. *Frontiers in Psychology*, *13*, 806176. https://doi.org/10.3389/fpsyg.2022.806176

Cocking, C. (2013). Collective resilience versus collective vulnerability after disasters - a social psychological perspective. In R. Arora & P. Arora (Eds.), *Disaster Management: Medical Preparedness, Response & Homeland Security* (pp. 449–463). CAB International.

Cocking, C., & Drury, J. (2004). Generalization of efficacy as a function of collective action and intergroup relations: Involvement in an anti-roads struggle. *Journal of Applied Social Psychology*, *34*, 417–444. https://doi.org/10.1111/j.1559-1816.2004.tb02555.x

Coffee, P., & Schertzinger, M. (2020). Physical Activity at University: Examining the Social (Exerciser) Identity and Exercise Attendance Relationship. *Journal of Sport and Exercise Psychology*, *42*, S72. https://doi.org/10.1123/jsep.2020-0172

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385–396.

Corpus, J. H., & Wormington, S. V. (2014). Profiles of Intrinsic and Extrinsic Motivations in Elementary School: A Longitudinal Analysis. *Journal of Experimental Education*, *82*, 480–501. https://doi.org/10.1080/00220973.2013.876225

Cox, A., & Williams, L. (2008). The Roles of Perceived Teacher Support, Motivational Climate, and Psychological Need Satisfaction in Students' Physical Education Motivation. *Journal of Sport and Exercise Psychology*, *30*, 222–239. https://doi.org/10.1123/jsep.30.2.222

Craney, T. A., & Surles, J. G. (2002). Model-dependent variance inflation factor cutoff values. *Quality Engineering*, *14*, 391–403. https://doi.org/10.1081/qen-120001878

Cruwys, T., Haslam, S. A., Dingle, G. A., Haslam, C., & Jetten, J. (2014). Depression and social identity: An integrative review. *Personality and Social Psychology Review*, *18*, 215–238. https://doi.org/10.1177/1088868314523839

Cuevas-Campos, R., Fernández-Bustos, J. G., González-Cutre, D., & Hernández-Martínez, A. (2020). Need Satisfaction and Need Thwarting in Physical Education and Intention to be

Physically Active. *Sustainability: Science Practice and Policy*, *12*, 7312. https://doi.org/10.3390/su12187312

Curran, T., Hill, A. P., Ntoumanis, N., Hall, H. K., & Jowett, G. E. (2016). A three-wave longitudinal test of self-determination theory's mediation model of engagement and disaffection in youth sport. *Journal of Sport and Exercise Psychology*, *38*, 15–29. https://doi.org/10.1123/jsep.2015-0016

Dalmaijer, E. S., Nord, C. L., & Astle, D. E. (2022). Statistical power for cluster analysis. *BMC Bioinformatics*, *23*, 205. https://doi.org/10.1186/s12859-022-04675-1

Damaso, K. A. M., Castro, S. C., Todd, J., Strayer, D. L., Provost, A., Matzke, D., & Heathcote, A. (2022). A cognitive model of response omissions in distraction paradigms. *Memory and Cognition*, *50*, 962–978. https://doi.org/10.3758/s13421-021-01265-z

Daumiller, M., Rinas, R., & Breithecker, J. (2022). Elite athletes' achievement goals, burnout levels, psychosomatic stress symptoms, and coping strategies. *International Journal of Sport and Exercise Psychology*, *20*, 416–435. https://doi.org/10.1080/1612197x.2021.1877326

de Souza, L. E. C., de Lima, T. J. S., Maia, L. M., Fontenele, A. B. G., & Lins, S. L. B. (2019). A hierarchical (multicomponent) model of in-group identification: adaptation of a measure to the Brazilian context. *Psicologia: Reflexao e Crítica*, *32*, 19. https://doi.org/10.1186/s41155-019-0131-6

De Backer, M., Boen, F., Ceux, T., De Cuyper, B., Høigaard, R., Callens, F., Fransen, K., & Vande Broek, G. (2011). Do perceived justice and need support of the coach predict team identification and cohesion? Testing their relative importance among top volleyball and handball players in Belgium and Norway. *Psychology of Sport and Exercise*, *12*, 192–201. https://doi.org/10.1016/j.psychsport.2010.09.009

De Cuyper, B., Boen, F., Van Beirendonck, C., Vanbeselaere, N., & Fransen, K. (2016). When do elite cyclists go the extra mile? Team identification mediates the relationship between perceived leadership qualities of the captain and social laboring. *International Journal of Sport Psychology*, *47*, 355–372. https://doi.org/10.7352/IJSP.2016.47.355

De Francisco, C., Arce, C., Vílchez, M. D. P., & Vales, Á. (2016). Antecedents and consequences of burnout in athletes: Perceived stress and depression. *International journal of Clinical and Health Psychology: IJCHP*, *16*, 239–246. https://doi.org/10.1016/j.ijchp.2016.04.001

De Francisco, C., Sanchez-Romero, E. I., Vilchez Conesa, M. D. P., & Arce, C. (2020). Basic Psychological Needs, Burnout and Engagement in Sport: The Mediating Role of Motivation Regulation. *International Journal of Environmental Research and Public Health*, *17*. https://doi.org/10.3390/ijerph17144941

Deary, I. J., Liewald, D., & Nissan, J. (2011). A free, easy-to-use, computer-based simple and four-choice reaction time programme: the Deary-Liewald reaction time task. *Behavior Research Methods*, *43*, 258–268. https://doi.org/10.3758/s13428-010-0024-1

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*, 627–68, discussion 692–700. https://doi.org/10.1037/0033-2909.125.6.627

Deci, E., Vallerand, R., Pelletier, L., & Ryan, R. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, *26*, 325–346. https://doi.org/10.1207/s15326985ep2603&4_6

Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-Determination Theory in Work Organizations: The State of a Science. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*, 19–43. https://doi.org/10.1146/annurev-orgpsych-032516-113108

Deci, E. L., & Ryan, R. M. (1985a). *Intrinsic Motivation and Self-Determination in Human Behavior* (first). Springer US. https://doi.org/10.1007/978-1-4899-2271-7

Deci, E. L., & Ryan, R. M. (1985b). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*, 109–134. https://doi.org/10.1016/0092-6566(85)90023-6

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268. https://doi.org/10.1207/s15327965pli1104_01

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology*, *49*, 182–185. https://doi.org/10.1037/a0012801

Deci, E. L., & Ryan, R. M. (2012). Motivation, personality, and development within embedded social contexts: An overview of self-determination theory. *The Oxford Handbook of Human Motivation*, *579*, 85–107. https://doi.org/10.1093/oxfordhb/9780195399820.013.0006

Deci, E. L., & Ryan, R. M. (2015, January 1). Self-Determination Theory. In J. D. Wright (Ed.), *International Encyclopedia of the Social and Behavioral Sciences* (pp. 486–491). Elsevier. https://doi.org/10.1016/B978-0-08-097086-8.26036-4

Deci, E. L., Ryan, R. M., GagnE, M., Leone, D. R., Usunov, J., & Kornazheva, B. P. (2001). Need Satisfaction, Motivation, and Well-Being in the Work Organizations of a Former Eastern Bloc Country: A Cross-Cultural Study of Self-Determination. *Personality and Social Psychology Bulletin*, *27*, 930–942. https://doi.org/10.1177/0146167201278002

Deci, R. M., & Ryan, E. L. (2002). Overview of self-determination theory: An organismic dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of Self-Determination Research* (pp. 3–33). University of Rochester Press.

DeFreese, J. D., Madigan, D. J., & Gustafsson, H. (2023). Eras of burnout research: What does the past tell us about the future of burnout in sport? *Journal of Clinical Sport Psychology*, *17*, 1–11. https://doi.org/10.1123/jcsp.2023-0046

DeJoy, D. M., & Wilson, M. G. (2003). Organizational health promotion: broadening the horizon of workplace health promotion. *American Journal of Health Promotion*, *17*, 337–341. https://doi.org/10.4278/0890-1171-17.5.337

Di Bernardo, G. A., Vezzali, L., Stathi, S., McKeown, S., Cocco, V. M., Saguy, T., & Dixon, J. (2021). Fostering social change among advantaged and disadvantaged group members: Integrating intergroup contact and social identity perspectives on collective action. *Group Processes and Intergroup Relations*, *24*, 26–47. https://doi.org/10.1177/1368430219889134

Diehl, M., & Stroebe, W. (1987). Productivity Loss In Brainstorming Groups: Toward the Solution of a Riddle. *Journal of Personality and Social Psychology*, *53*, 497–509. https://doi.org/10.1037/0022-3514.53.3.497

Doosje, B., Ellemers, N., & Spears, R. (1995). Perceived Intragroup Variability as a Function of Group Status and Identification. *Journal of Experimental Social Psychology*, *31*, 410–436. https://doi.org/10.1006/jesp.1995.1018

Douglas, B. D., Ewell, P. J., & Brauer, M. (2023). Data quality in online human-subjects research: Comparisons between MTurk, Prolific, CloudResearch, Qualtrics, and SONA. *PloS One*, *18*, e0279720. https://doi.org/10.1371/journal.pone.0279720

Drury, J., Cocking, C., Reicher, S., Burton, A., Schofield, D., Hardwick, A., Graham, D., & Langston, P. (2009). Cooperation versus competition in a mass emergency evacuation: a new

laboratory simulation and a new theoretical model. *Behavior Research Methods*, *41*, 957–970. https://doi.org/10.3758/BRM.41.3.957

Drury, J., & Reicher, S. (2005). Explaining enduring empowerment: a comparative study of collective action and psychological outcomes. *European Journal of Social Psychology*, *35*, 35–58. https://doi.org/10.1002/ejsp.231

Dukerich, J. M., Golden, B. R., & Shortell, S. M. (2002). Beauty is in the Eye of the Beholder: The Impact of Organizational Identification, Identity, and Image on the Cooperative Behaviors of Physicians. *Administrative Science Quarterly*, *47*, 507–533. https://doi.org/10.2307/3094849

Dunstone, E. K., Reynolds, K. J., & Cárdenas, D. (2023). The role of group memberships and school identification on student well-being. *The British Journal of Social Psychology*. https://doi.org/10.1111/bjso.12685

Dykiert, D., Der, G., Starr, J. M., & Deary, I. J. (2012). Age differences in intra-individual variability in simple and choice reaction time: systematic review and meta-analysis. *PLoS One*, *7*, e45759. https://doi.org/10.1371/journal.pone.0045759

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology*, *36*, 2240–2265. https://doi.org/10.1111/j.0021-9029.2006.00102.x

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2007). Adherence and well-being in overweight and obese patients referred to an exercise on prescription scheme: A self-determination theory perspective. *Psychology of Sport and Exercise*, *8*, 722–740. https://doi.org/10.1016/j.psychsport.2006.07.006

Ellemers, N., De Gilder, D., & Haslam, S. A. (2004). Motivating individuals and groups at work: A social identity perspective on leadership and group performance. *Academy of Management Review*, *29*, 459–478. https://doi.org/10.5465/amr.2004.13670967

Ellemers, N., & Haslam, S. A. (2012). Social identity theory. *Handbook of Theories of Social Psychology*, *2*.

Ellemers, N., Spears, R., & Doosje, B. (2002). Self and social identity. *Annual Review of Psychology*, *53*, 161–186. https://doi.org/10.1146/annurev.psych.53.100901.135228

Emm-Collison, L. G., Sebire, S. J., Salway, R., Thompson, J. L., & Jago, R. (2020). Multidimensional motivation for exercise: A latent profile and transition analysis. *Psychology of Sport and Exercise*, *47*, 101619. https://doi.org/10.1016/j.psychsport.2019.101619

Estabrooks, P. A., Smith-Ray, R. L., Almeida, F. A., Hill, J., Gonzales, M., Schreiner, P., & Van Den Berg, R. (2011). Move More: Translating an efficacious group dynamics physical activity intervention into effective clinical practice. *International Journal of Sport and Exercise Psychology*, *9*, 4–18. https://doi.org/10.1080/1612197X.2011.563123

Evans, A. L. (2014). *The Meaning of Groups: The Importance and Role of the Content of Social Identities for Cognition and Behaviour*.

Failing, M., & Theeuwes, J. (2017). Don't let it distract you: how information about the availability of reward affects attentional selection. *Attention, Perception and Psychophysics*, *79*, 2275–2298. https://doi.org/10.3758/s13414-017-1376-8

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*, 175–191. https://doi.org/10.3758/bf03193146

Fayant, M.-P., Sigall, H., Lemonnier, A., Retsin, E., & Alexopoulos, T. (2017). On the limitations of manipulation checks: An obstacle toward cumulative science. *International Review of Social Psychology*, *30*, 125. https://doi.org/10.5334/irsp.102

Field, A. (2009, March 2). *Discovering Statistics Using SPSS* (3rd ed.). SAGE Publications.

Floyd, A., & Moyer, A. (2009). Group vs. individual exercise interventions for women with breast cancer: a meta-analysis. *Health Psychology Review*, *4*, 22–41. https://doi.org/10.1080/17437190903384291

Foddy, M., Platow, M. J., & Yamagishi, T. (2009). Group-based trust in strangers: the role of stereotypes and expectations. *Psychological Science*, *20*, 419–422. https://doi.org/10.1111/j.1467-9280.2009.02312.x

Fransen, K., Boen, F., Vansteenkiste, M., Mertens, N., & Vande Broek, G. (2018). The power of competence support: The impact of coaches and athlete leaders on intrinsic motivation and performance. *Scandinavian Journal of Medicine and Science in Sports*, *28*, 725–745. https://doi.org/10.1111/sms.12950

Fransen, K., Steffens, N. K., Haslam, S. A., Vanbeselaere, N., Vande Broek, G., & Boen, F. (2016). We will be champions: Leaders' confidence in 'us' inspires team members' team confidence and performance. *Scandinavian Journal of Medicine and Science in Sports*, *26*, 1455–1469. https://doi.org/10.1111/sms.12603

Fransen, K., Cruwys, T., Haslam, C., Iserbyt, P., Seghers, J., Vanderlinden, J., van Uffelen, J., Verbaanderd, E., & Boen, F. (2022). Leading the way together: a cluster randomised controlled trial of the 5R Shared Leadership Program in older adult walking groups. *The International Journal of Behavioral Nutrition and Physical Activity*, *19*, 63. https://doi.org/10.1186/s12966-022-01297-x

Fransen, K., Haslam, S. A., Steffens, N. K., Peters, K., Mallett, C. J., Mertens, N., & Boen, F. (2020). All for us and us for all: Introducing the 5R Shared Leadership Program. *Psychology of Sport and Exercise*, *51*, 101762. https://doi.org/10.1016/j.psychsport.2020.101762

Fransen, K., Haslam, S. A., Steffens, N. K., Vanbeselaere, N., De Cuyper, B., & Boen, F. (2015). Believing in "us": Exploring leaders' capacity to enhance team confidence and performance by building a sense of shared social identity. *Journal of Experimental Psychology Applied*, *21*, 89–100. https://doi.org/10.1037/xap0000033

Fransen, K., Vansteenkiste, M., Vande Broek, G., & Boen, F. (2018). The competence-supportive and competence-thwarting role of athlete leaders: An experimental test in a soccer context. *PloS One*, *13*, e0200480. https://doi.org/10.1371/journal.pone.0200480

Frederick, C. M., & Ryan, R. M. (1995). Self-determination in sport: A review using cognitive evaluation theory. *International Journal of Sport Psychology*, *26*, 5–23.

Gagne, M., Ryan, R. M., & Bargmann, K. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology*, *15*, 372–390. https://doi.org/10.1080/10413200390238031

Gagne, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior*, *26*, 331–362. https://doi.org/10.1002/job.322

Garcia-Mas, A., Palou, P., Gili, M., Ponseti, X., Borras, P. A., Vidal, J., Cruz, J., Torregrosa, M., Villamarín, F., & Sousa, C. (2010). Commitment, enjoyment and motivation in young soccer competitive players. *The Spanish Journal of Psychology*, *13*, 609–616. https://doi.org/10.1017/s1138741600002286

Gerber, M., Gustafsson, H., Seelig, H., Kellmann, M., Ludyga, S., Colledge, F., Brand, S., Isoard-Gautheur, S., & Bianchi, R. (2018). Usefulness of the Athlete Burnout Questionnaire (ABQ) as a screening tool for the detection of clinically relevant burnout symptoms among young elite athletes. *Psychology of Sport and Exercise*, *39*, 104–113. https://doi.org/10.1016/j.psychsport.2018.08.005

Gillet, N., Berjot, S., Vallerand, R. J., Amoura, S., & Rosnet, E. (2012). Examing the motivation-performance relationship in competive sport: A cluster-analytic approach. *International Journal of Sport Psychology*, *43*, 79–102.

Gillet, N., Fouquereau, E., Forest, J., Brunault, P., & Colombat, P. (2012). The Impact of Organizational Factors on Psychological Needs and Their Relations with Well-Being. *Journal of Business and Psychology*, *4*, 437–450. https://doi.org/10.1007/s10869-011-9253-2

Gillet, N., Morin, A. J. S., Choisay, F., & Fouquereau, E. (2019). A Person-Centered Representation of Basic Need Satisfaction Balance at Work. *Journal of Personnel Psychology*, *18*, 113–128. https://doi.org/10.1027/1866-5888/a000228

Gillet, N., Morin, A. J. S., & Reeve, J. (2017). Stability, change, and implications of students' motivation profiles: A latent transition analysis. *Contemporary Educational Psychology*, *51*, 222–239. https://doi.org/10.1016/j.cedpsych.2017.08.006

Gillet, N., Vallerand, R. J., Amoura, S., & Baldes, B. (2010). Influence of coaches' autonomy support on athletes' motivation and sport performance: A test of the hierarchical model of intrinsic and extrinsic motivation. *Psychology of Sport and Exercise*, *11*, 155–161. https://doi.org/10.1016/j.psychsport.2009.10.004

Gillet, N., Vallerand, R. J., & Rosnet, E. (2009). Motivational clusters and performance in a real-life setting. *Motivation and Emotion*, *33*, 49–62. https://doi.org/10.1007/s11031-008-9115-z

Glandorf, H. L., Coffee, P., & Madigan, D. J. (2022). Team identification and athlete burnout: Testing longitudinal serial mediation via perceived support and stress. *Psychology of Sport and Exercise*, *63*, 102292. https://doi.org/10.1016/j.psychsport.2022.102292

Glandorf, H. L., Madigan, D. J., Kavanagh, O., & Mallinson-Howard, S. H. (2023). Mental and physical health outcomes of burnout in athletes: a systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*, 1–45. https://doi.org/10.1080/1750984x.2023.2225187

González, L., Tomás, I., Castillo, I., Duda, J. L., & Balaguer, I. (2017). A test of basic psychological needs theory in young soccer players: time-lagged design at the individual and team levels. *Scandinavian Journal of Medicine and Science in Sports*, *27*, 1511–1522. https://doi.org/10.1111/sms.12778

González, L., García-Merita, M., Castillo, I., & Balaguer, I. (2016). Young Athletes' Perceptions of Coach Behaviors and Their Implications on Their Well- and Ill-Being Over Time. *Journal of*

Strength and Conditioning Research, *30*, 1147–1154. https://doi.org/10.1519/JSC.0000000000001170

Goudas, M., Biddle, S., & Fox, K. (1994). Perceived locus of causality, goal orientations, and perceived competence in school physical education classes. *The British Journal of Educational Psychology*, *64*, 453–463. https://doi.org/10.1111/j.2044-8279.1994.tb01116.x

Grasten, A., John Wang, C. K., Huhtiniemi, M., & Jaakkola, T. (2023). Stability and transitions in school-aged children's physical education need satisfaction profiles: A latent transition analysis. *Asian Journal of Sport and Exercise Psychology*, *3*, 74–81. https://doi.org/10.1016/j.ajsep.2022.09.004

Gray, C. M., Wyke, S., Zhang, R., Anderson, A. S., Barry, S., Brennan, G., Briggs, A., Boyer, N., Bunn, C., Donnachie, C., Grieve, E., Kohli-Lynch, C., Lloyd, S., McConnachie, A., McCowan, C., McLean, A., Mutrie, N., & Hunt, K. (2018). Long-term weight loss following a randomised controlled trial of a weight management programme for men delivered through professional football clubs: the Football Fans in Training follow-up study. *Public Health Research*, *6*, 1–114. https://doi.org/10.3310/phr06090

Grebner, K., Michel-Kröhler, A., Werner, T., Berti, S., & Wessa, M. (2024). Differences in predicting athletic burnout and in moderating its relationship with life satisfaction in competitive and leisure athletes. *Scientific Reports*, *14*. https://doi.org/10.1038/s41598-024-74908-1

Greenaway, K. H., Cruwys, T., Haslam, S. A., & Jetten, J. (2015). Social identities promote well-being because they satisfy global psychological needs. *European Journal of Social Psychology*, *00*. https://doi.org/10.1002/ejsp.2169

Greenaway, K., Amiot, C. E., Louis, W. R., & Bentley, S. V. (2017). The role of psychological need satisfaction in promoting student identification. In *Self and Social Identity in Educational Contexts* (pp. 176–192). Routledge. https://doi.org/10.4324/9781315746913-ch10

Greenaway, K. H., Haslam, S. A., Cruwys, T., Branscombe, N. R., Ysseldyk, R., & Heldreth, C. (2015). From "we" to "me": Group identification enhances perceived personal control with consequences for health and well-being. *Journal of Personality and Social Psychology*, *109*, 53–74. https://doi.org/10.1037/pspi0000019

Greenaway, K. H., Sankaran, S., Wolf, S. A., & Mitchell, J. (2020). Motivation. In S. A. Haslam, F. Boen, & K. Fransen (Eds.), *The New Psychology of Sport and Exercise: The Social Identity Approach* (pp. 94–128). Sage Publications Ltd.

Gustafsson, H., Carlin, M., Podlog, L., Stenling, A., & Lindwall, M. (2018). Motivational profiles and burnout in elite athletes: A person-centered approach. *Psychology of Sport and Exercise*, *35*, 118–125. https://doi.org/10.1016/j.psychsport.2017.11.009

Gustafsson, H., DeFreese, J. D., & Madigan, D. J. (2017). Athlete burnout: review and recommendations. *Current Opinion in Psychology*, *16*, 109–113. https://doi.org/10.1016/j.copsyc.2017.05.002

Gustafsson, H., Martinent, G., Isoard-Gautheur, S., Hassmén, P., & Guillet-Descas, E. (2018). Performance based self-esteem and athlete-identity in athlete burnout: A person-centered approach. *Psychology of Sport and Exercise*, *38*, 56–60. https://doi.org/10.1016/j.psychsport.2018.05.017

Hagger, M., & Chatzisarantis, N. (2008). Self-determination Theory and the psychology of exercise. *International Review of Sport and Exercise Psychology*, *1*, 79–103. https://doi.org/10.1080/17509840701827437

Hagger, M. S., Chatzisarantis, N. L. D., Barkoukis, V., Wang, C. K. J., & Baranowski, J. (2005). Perceived Autonomy Support in Physical Education and Leisure-Time Physical Activity: A Cross-Cultural Evaluation of the Trans-Contextual Model. *Journal of Educational Psychology*, *97*, 376–390. https://doi.org/10.1037/0022-0663.97.3.376

Hagger, M. S., & Hamilton, K. (2021). General causality orientations in self-determination theory: Meta-analysis and test of a process model. *European Journal of Personality*, *35*, 710–735. https://doi.org/10.1177/0890207020962330

Hair, J. F., Black, B., Babin, B. J., & Anderson, R. (2010). *Multivariate Data Analysis* (7th ed.). Pearson.

Hair, J. F., Jr, Risher, J., Sarstedt, M., & Ringle, C. M. (2018). When to use and how to report the results of PLS-SEM. *European Business Review*, *31*. https://doi.org/10.1108/EBR-11-2018-0203

Hammarström, P., Rosendahl, S., Gruber, M., & Nordin, S. (2023). Somatic symptoms in burnout in a general adult population. *Journal of Psychosomatic Research*, *168*, 111217. https://doi.org/10.1016/j.jpsychores.2023.111217

Hardy, S. A., Nelson, J. M., Frandsen, S. B., Cazzell, A. R., & Goodman, M. A. (2022). Adolescent Religious Motivation: A Self-Determination Theory Approach. *The International Journal for the Psychology of Religion*, *32*, 16–30. https://doi.org/10.1080/10508619.2020.1844968

Harrison, D. A., Price, K. H., & Bell, M. P. (1998). Beyond Relational Demography: Time and the Effects of Surface- and Deep-Level Diversity on Work Group Cohesion. *Academy of Management Journal*, *41*, 96–107. https://doi.org/10.2307/256901

Haslam, A. S., Reutas, J., Bentley, S. V., McMillan, B., Lindfield, M., Luong, M., Peters, K., & Steffens, N. K. (2023). Developing engaged and 'teamful' leaders: A randomized controlled trial of the 5R identity leadership program. *PloS One*, *18*, e0286263. https://doi.org/10.1371/journal.pone.0286263

Haslam, C., Cruwys, T., Chang, M. X.-L., Bentley, S. V., Haslam, S. A., Dingle, G. A., & Jetten, J. (2019). GROUPS 4 HEALTH reduces loneliness and social anxiety in adults with psychological distress: Findings from a randomized controlled trial. *Journal of Consulting and Clinical Psychology*, *87*, 787–801. https://doi.org/10.1037/ccp0000427

Haslam, C., Cruwys, T., Haslam, S. A., Dingle, G., & Chang, M. X.-L. (2016). Groups 4 Health: Evidence that a social-identity intervention that builds and strengthens social group membership improves mental health. *Journal of Affective Disorders*, *194*, 188–195. https://doi.org/10.1016/j.jad.2016.01.010

Haslam, C., Lam, B. C. P., Ghafoori, E., Steffens, N. K., Haslam, S. A., Bentley, S. V., Cruwys, T., & La Rue, C. J. (2023). A longitudinal examination of the role of social identity in supporting health and well-being in retirement. *Psychology and Aging*. https://doi.org/10.1037/pag0000757

Haslam, S., Steffens, N. K., Peters, K., Boyce, R. A., Mallett, C. J., & Fransen, K. (2017). A Social Identity Approach to Leadership Development. *Journal of Personnel Psychology*, *16*, 113–124. https://doi.org/10.1027/1866-5888/a000176

Haslam, S. A. (2004). *Psychology in Organizations*. SAGE Publications.

Haslam, S. A., & Ellemers, N. (2005). Social Identity in Industrial and Organizational Psychology: Concepts, Controversies, and Contributions. In G. P. Hodgkinson & J. K. Ford (Eds.), *International review of industrial and organizational psychology 2005: Volume 20: 2005* (pp. 39–118). Wiley-Blackwell. https://doi.org/10.1002/0470029307

Haslam, S. A., Jetten, J., & Waghorn, C. (2009). Social identification, stress and citizenship in teams: A five-phase longitudinal study. *Stress and Health: Journal of the International Society for the Investigation of Stress*, *25*, 21–30. https://doi.org/10.1002/smi.1221

Haslam, S. A., Boen, F., & Fransen, K. (Eds.). (2020). *The new psychology of sport and exercise: The social identity approach* (1st ed.). Sage Publications Ltd.

Haslam, S. A., Boen, F., Fransen, K., & Reicher, S. (2020). The social identity approach to sport and exercise psychology. In S. A. Haslam, F. Boen, & K. Fransen (Eds.), *The new psychology of sport and exercise: The social identity approach* (pp. 15–38). Sage Publications Ltd.

Haslam, S. A., Haslam, C., Cruwys, T., Jetten, J., Bentley, S. V., Fong, P., & Steffens, N. K. (2022). Social identity makes group-based social connection possible: Implications for loneliness and mental health. *Current Opinion in Psychology*, *43*, 161–165. https://doi.org/10.1016/j.copsyc.2021.07.013

Haslam, S. A., Jetten, J., O'Brien, A., & Jacobs, E. (2004). Social identity, social influence and reactions to potentially stressful tasks: support for the self-categorization model of stress. *Stress and Health: Journal of the International Society for the Investigation of Stress*, *20*, 3–9. https://doi.org/10.1002/smi.995

Haslam, S. A., O'Brien, A., Jetten, J., Vormedal, K., & Penna, S. (2005). Taking the strain: social identity, social support, and the experience of stress. *The British Journal of Social Psychology*, *44*, 355–370. https://doi.org/10.1348/014466605X37468

Haslam, S. A., Powell, C., & Turner, J. (2000). Social identity, self-categorization, and work motivation: Rethinking the contribution of the group to positive and sustainable organisational outcomes. *Applied Psychology*, *49*, 319–339. https://doi.org/10.1111/1464-0597.00018

Haslam, S. A., & Reicher, S. (2006). Stressing the group: social identity and the unfolding dynamics of responses to stress. *The Journal of Applied Psychology*, *91*, 1037–1052. https://doi.org/10.1037/0021-9010.91.5.1037

Hauser, D., Paolacci, G., & Chandler, J. (2019). Common concerns with MTurk as a participant pool: Evidence and solutions. In *Handbook of research methods in consumer psychology* (pp. 319–337). Routledge.

Hauser, D. J., Ellsworth, P. C., & Gonzalez, R. (2018). Are Manipulation Checks Necessary? *Frontiers in Psychology*, *9*, 998. https://doi.org/10.3389/fpsyg.2018.00998

Hayduk, L. A., & Littvay, L. (2012). Should researchers use single indicators, best indicators, or multiple indicators in structural equation models? *BMC Medical Research Methodology*, *12*, 159. https://doi.org/10.1186/1471-2288-12-159

Hogg, M. (2008). Personality, Individuality, and Social Identity. In F. Rhodewalt (Ed.), *Personality and Social Behavior* (pp. 177–196). Psychology Press.

Hogg, M. A., Terry, D. J., & White, M. (1995). A tale of two theories: A critical comparison of identity theory with social identity theory. *Social Psychology Quarterly*, *58*, 255–269. https://doi.org/10.2307/2787127

Hogg, M. A. (2000). Subjective Uncertainty Reduction through Self-categorization: A Motivational Theory of Social Identity Processes. *European Review of Social Psychology*, *11*, 223–255. https://doi.org/10.1080/14792772043000040

Hogg, M. A. (2001). Self-categorization and subjective uncertainty resolution: Cognitive and motivational facets of social identity and group membership. In J. P. Forgas (Ed.), *The social mind: Cognitive and motivational aspects of interpersonal behavior* (pp. 323–349, Vol. 444). Cambridge University Press, xvi.

Hogg, M. A. (2012). Social identity and the psychology of groups. *Handbook of self and identity., 2nd ed.*, *2*, 502–519.

Hogg, M. A., Abrams, D., Otten, S., & Hinkle, S. (2004). The Social Identity Perspective: Intergroup Relations, Self-Conception, and Small Groups. *Small Group Research*, *35*, 246–276. https://doi.org/10.1177/1046496404263424

Hogg, M. A., & Turner, J. C. (1987). Intergroup behaviour, self-stereotyping and the salience of social categories. *The British Journal of Social Psychology*, *26*, 325–340. https://doi.org/10.1111/j.2044-8309.1987.tb00795.x

Hoigaard, R., Cuyper, B. D., Peters, D. M., & Boen, F. (2013). Team identification reduces social loafing and promotes social laboring in cycling. *International Journal of Applied Sports Sciences*, *25*, 33–40. https://doi.org/10.24985/ijass.2013.25.1.33

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *The Electronic Journal of Business Research Methods*, *6*, 53–60.

Hopkins, N., Reicher, S., Harrison, K., Cassidy, C., Bull, R., & Levine, M. (2007). Helping to improve the group stereotype: on the strategic dimension of prosocial behavior. *Personality and Social Psychology Bulletin*, *33*, 776–788. https://doi.org/10.1177/0146167207301023

Hornsey, M. J. (2008). Social identity theory and self-categorization theory: A historical review. *Social and Personality Psychology Compass*, *2*, 204–222. https://doi.org/10.1111/j.1751-9004.2007.00066.x

Howard, J., Gagne, M., Morin, A. J. S., & Van den Broeck, A. (2016). Motivation profiles at work: A self-determination theory approach. *Journal of Vocational Behavior*, *95-96*, 74–89. https://doi.org/10.1016/j.jvb.2016.07.004

Howard, J. L., Gagne, M., & Bureau, Julien S. (2017). Testing a continuum structure of self-determined motivation: A meta-analysis. *Psychological Bulletin*, *143*, 1346–1377. https://doi.org/10.1037/bul0000125

Howard, J. L., Gagné, M., Van den Broeck, A., Guay, F., Chatzisarantis, N., Ntoumanis, N., & Pelletier, L. G. (2020). A review and empirical comparison of motivation scoring methods: An application to self-determination theory. *Motivation and Emotion*, *44*, 534–548. https://doi.org/10.1007/s11031-020-09831-9

Howard, M. C., & Magee, S. M. (2013). To boldly go where no group has gone before: An analysis of online group identity and validation of a measure. *Computers in Human Behavior*, *29*, 2058–2071. https://doi.org/10.1016/j.chb.2013.04.009

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A multidisciplinary Journal*, *6*, 1–55. https://doi.org/10.1080/10705519909540118

Hunt, K., Wyke, S., Bunn, C., Donnachie, C., Reid, N., & Gray, C. M. (2020). Scale-up and scale-out of a gender-sensitized weight management and healthy living program delivered to overweight men via professional sports clubs: The wider implementation of Football Fans in Training (FFIT). *International Journal of Environmental Research and Public Health*, *17*, 584. https://doi.org/10.3390/ijerph17020584

Huyghebaert-Zouaghi, T., Morin, A. J. S., Forest, J., Fouquereau, E., & Gillet, N. (2022). A longitudinal examination of nurses' need satisfaction profiles: A latent transition analysis. *Current Psychology*, *41*, 4837–4859. https://doi.org/10.1007/s12144-020-00972-1

Huynh, H., & Feldt, L. S. (1976). Estimation of the box correction for degrees of freedom from sample data in randomized block and split-plot designs. *Journal of Educational and Behavioral Statistics*, *1*, 69–82. https://doi.org/10.3102/10769986001001069

Jaakkola, T., Wang, C. K. J., Soini, M., & Liukkonen, J. (2015). Students' Perceptions of Motivational Climate and Enjoyment in Finnish Physical Education: A Latent Profile Analysis. *Journal of Sports Science and Medicine*, *14*, 477–483.

Jackman, P. C., Slater, M. J., Carter, E. E., Sisson, K., & Bird, M. D. (2023). Social support, social identification, mental wellbeing, and psychological distress in doctoral students: A person-centred analysis. *Journal of Further and Higher Education*, *47*, 45–58. https://doi.org/10.1080/0309877X.2022.2088272

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An Introduction to Statistical Learning with Application in R*. Springer New York. https://doi.org/10.1007/978-1-4614-7138-7

James, K., & Greenberg, J. (1989). In-group salience, intergroup comparison, and individual performance and self-esteem. *Personality and Social Psychology Bulletin*, *15*, 604–616. https://doi.org/10.1177/0146167289154013

Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction*, *43*, 27–38. https://doi.org/10.1016/j.learninstruc.2016.01.002

Jeno, L. M., & Diseth, A. (2014). A self-determination theory perspective on autonomy support, autonomous self-regulation, and perceived school performance. *Reflecting Education*, *9*, 1–20.

Jetten, J., Haslam, S. A., Cruwys, T., Greenaway, K. H., Haslam, C., & Steffens, N. K. (2017). Advancing the social identity approach to health and well-being: Progressing the social cure research agenda. *European Journal of Social Psychology*, *47*, 789–802. https://doi.org/10.1002/ejsp.2333

Jetten, J., Branscombe, N. R., Haslam, S. A., Haslam, C., Cruwys, T., Jones, J. M., Cui, L., Dingle, G., Liu, J., Murphy, S. C., Thai, A., Walter, Z., & Zhang, A. (2015). Having a lot of a good thing: multiple important group memberships as a source of self-esteem. *PloS One*, *10*, e0124609. https://doi.org/10.1371/journal.pone.0124609

Jetten, J., Branscombe, N. R., Schmitt, M. T., & Spears, R. (2001). Rebels with a Cause: Group Identification as a Response to Perceived Discrimination from the Mainstream. *Personality and Social Psychology Bulletin*, *27*, 1204–1213. https://doi.org/10.1177/0146167201279012

Jones, M., Meijen, C., McCarthy, P. J., & Sheffield, D. (2009). A Theory of Challenge and Threat States in Athletes. *International Review of Sport and Exercise Psychology*, *2*, 161–180. https://doi.org/10.1080/17509840902829331

Joussemet, M., Landry, R., & Koestner, R. (2008). A self-determination theory perspective on parenting. *Canadian Psychology*, *49*, 194–200. https://doi.org/10.1037/a0012754

Kachanoff, F. J., Taylor, D. M., Caouette, J., Khullar, T. H., & Wohl, M. J. A. (2019). The chains on all my people are the chains on me: Restrictions to collective autonomy undermine the personal autonomy and psychological well-being of group members. *Journal of Personality and Social Psychology*, *116*, 141–165. https://doi.org/10.1037/pspp0000177

Kälin, S., Roebers, C. M., & Oeri, N. (2023). Persistence development across the transition to school: A latent profile transition analysis. *Early Education and Development*, *34*, 71–85. https://doi.org/10.1080/10409289.2021.1985049

Kam, C., Morin, A. J. S., Meyer, J. P., & Topolnytsky, L. (2016). Are Commitment Profiles Stable and Predictable? A Latent Transition Analysis. *Journal of Management*, *42*, 1462–1490. https://doi.org/10.1177/0149206313503010

Kelley, J. B., & Alden, D. L. (2016). Online brand community: through the eyes of Self-Determination Theory. *Internet Research*, *26*, 790–808. https://doi.org/10.1108/IntR-01-2015-0017

Kim, G., & Gurvitch, R. (2020). The effect of Sports-based Physical Activity programme on teachers' relatedness, stress and exercise motivation. *Health Education Journal*, *79*, 658–670. https://doi.org/10.1177/0017896920906185

Klik, K. A., Cárdenas, D., & Reynolds, K. J. (2023). School climate, school identification and student outcomes: A longitudinal investigation of student well-being. *The British Journal of Educational Psychology*, *93*, 806–824. https://doi.org/10.1111/bjep.12597

Kline, T. (2005, February 15). *Psychological Testing: A Practical Approach to Design and Evaluation*. SAGE.

Knight, C., & Haslam, S. A. (2010). The relative merits of lean, enriched, and empowered offices: an experimental examination of the impact of workspace management strategies on well-being and productivity. *Journal of Experimental Psychology Applied*, *16*, 158–172. https://doi.org/10.1037/a0019292

Koestner, R., Losier, G. F., Vallerand, R. J., & Carducci, D. (1996). Identified and introjected forms of political internalization: extending self-determination theory. *Journal of Personality and Social Psychology*, *70*, 1025–1036. https://doi.org/10.1037//0022-3514.70.5.1025

Koğar, E. Y., & Koğar, H. (2023). A systematic review and meta-analytic confirmatory factor analysis of the perceived stress scale (PSS-10 and PSS-14). *Stress and Health*, 1–13. https://doi.org/10.1002/smi.3285

La Barbera, F., & Capone, V. (2016). Five Dimensions of European Identity: A Contribution to the Italian Adaptation and Validation of the In-Group Identification Scale. *European Journal of Psychological Assessment*, *12*, 288–303. https://doi.org/10.5964/ejop.v12i2.1058

Lalonde, R. N. (1992). The Dynamics of Group Differentiation in the Face of Defeat. *Personality and Social Psychology Bulletin*, *18*, 336–342. https://doi.org/10.1177/0146167292183010

Lalonde, R. N., Moghaddam, F. M., & Taylor, D. M. (1987). The Process of Group Differentiation in a Dynamic Intergroup Setting. *The Journal of Social Psychology*, *127*, 273–287. https://doi.org/10.1080/00224545.1987.9713693

Lam, B. C. P., Haslam, C., Haslam, S. A., Steffens, N. K., Cruwys, T., Jetten, J., & Yang, J. (2018). Multiple social groups support adjustment to retirement across cultures. *Social Science and Medicine*, *208*, 200–208. https://doi.org/10.1016/j.socscimed.2018.05.049

Lawler, M., Heary, C., & Nixon, E. (2017). Variations in adolescents' motivational characteristics across gender and physical activity patterns: A latent class analysis approach. *BMC Public Health*, *17*, 661. https://doi.org/10.1186/s12889-017-4677-x

Leach, C. W., van Zomeren, M., Zebel, S., Vliek, M. L. W., Pennekamp, S. F., Doosje, B., Ouwerkerk, J. W., & Spears, R. (2008). Group-level self-definition and self-investment: A hierarchical (multicomponent) model of in-group identification. *Journal of Personality and Social Psychology*, *95*, 144–165. https://doi.org/10.1037/0022-3514.95.1.144

Leduc, J. G., Boucher, F., Marques, D. L., & Brunelle, E. (2024). Basic psychological need satisfaction of collegiate athletes: the unique and interactive effects of team identification and LMX quality. *Frontiers in Sports and Active Living*, *6*, 1342995. https://doi.org/10.3389/fspor.2024.1342995

Legault, L., & Amiot, C. E. (2014). The Role of Autonomy in Intergroup Processes: Toward an Integration of Self-Determination Theory and Intergroup Approaches. In N. Weinstein (Ed.), *Human Motivation and Interpersonal Relationships: Theory, Research, and Applications* (pp. 159–190). Springer Netherlands. https://doi.org/10.1007/978-94-017-8542-6_8

Lemyre, P.-N., Roberts, G. C., & Stray-Gundersen, J. (2007). Motivation, overtraining, and burnout: Can self-determined motivation predict overtraining and burnout in elite athletes? *European Journal of Sport Science*, *7*, 115–126. https://doi.org/10.1080/17461390701302607

Levine, M., Prosser, A., Evans, D., & Reicher, S. (2005). Identity and emergency intervention: how social group membership and inclusiveness of group boundaries shape helping behavior. *Personality and Social Psychology Bulletin*, *31*, 443–453. https://doi.org/10.1177/0146167204271651

Levine, R. M., & Reicher, S. D. (1996). Making sense of symptoms: self-categorization and the meaning of illness and injury. *The British Journal of Social Psychology*, *35 (Pt 2)*, 245–256. https://doi.org/10.1111/j.2044-8309.1996.tb01095.x

Li, C., Wang, C. K. J., Pyun, D. Y., & Kee, Y. H. (2013). Burnout and its relations with basic psychological needs and motivation among athletes: A systematic review and meta-analysis. *Psychology of Sport and Exercise*, *14*, 692–700. https://doi.org/10.1016/j.psychsport.2013.04.009

Lindwall, M., Weman-Josefsson, K., Sebire, S. J., & Standage, M. (2016). Viewing exercise goal content through a person-oriented lens: A self-determination perspective. *Psychology of Sport and Exercise*, *27*, 85–92. https://doi.org/10.1016/j.psychsport.2016.06.011

Lohbeck, A., Hohmann, A., von Keitz, P., & Daseking, M. (2022). Children's motivation profiles in sports and physical activities: A latent profile analysis and self-determination theory approach. *Journal of Sport and Exercise Psychology*, *44*, 251–262. https://doi.org/10.1123/jsep.2021-0279

Losier, G. F., & Vallerand, R. J. (1994). The temporal relationship between perceived competence and self-determined motivation. *The Journal of Social Psychology*, *134*, 793–801.

Lovakov, A. V., Agadullina, E. R., & Osin, E. N. (2015). A hierarchical (multicomponent) model of in-group identification: examining in Russian samples. *The Spanish Journal of Psychology*, *18*, E32. https://doi.org/10.1017/sjp.2015.37

Lower-Hoppe, L. M., Lee, W., Brgoch, S. M., Ryder, A., & Lowe, C. (2022). Making the Connection: Examining the Antecedents and Consequences of Athlete Burnout Among Collegiate Sport Club Athletes. *45*, 108–131.

Mageau, G. A., & Vallerand, R. J. (2003). The coach-athlete relationship: a motivational model. *Journal of Sports Sciences*, *21*, 883–904. https://doi.org/10.1080/0264041031000140374

Manzi, C., Paderi, F., & Benet-Martinez, V. (2023). Multiple social identities and well-being: Insights from a person-centred approach. *The British Journal of Social Psychology*. https://doi.org/10.1111/bjso.12704

Martela, F., Hankonen, N., Ryan, R. M., & Vansteenkiste, M. (2021). Motivating voluntary compliance to behavioural restrictions: Self-determination theory–based checklist of principles for COVID-19 and other emergency communications. *European Review of Social Psychology*, *32*, 305–347. https://doi.org/10.1080/10463283.2020.1857082

Martinent, G., & Decret, J.-C. (2015). Motivational profiles among young table-tennis players in intensive training settings: A latent profile transition analysis. *Journal of Applied Sport Psychology*, *27*, 268–287. https://doi.org/10.1080/10413200.2014.993485

Martinent, G., Gareau, A., Guillet-Descas, E., Lienhart, N., & Nicaise, V. (2021). Basic psychological need profiles among adolescent athletes in intensive training settings: Relationships with sport burnout and engagement. *International Journal of Stress Management*, *28*, 197–206. https://doi.org/10.1037/str0000226

Martinent, G., & Nicolas, M. (2016). A latent profile transition analysis of coping within competitive situations. *Sport, Exercise, and Performance Psychology*, *5*, 218–231. https://doi.org/10.1037/spy0000062

Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: recent research and its implications for psychiatry. *World Psychiatry*, *15*, 103–111. https://doi.org/10.1002/wps.20311

Maslow, A. H. (1943). A theory of human motivation. *Psychological Review*, *50*, 370–396. https://doi.org/10.1037/h0054346

McAuley, E., Duncan, T., & Tammen, V. V. (1989). Psychometric properties of the Intrinsic Motivation Inventory in a competitive sport setting: a confirmatory factor analysis. *Research Quarterly for Exercise and Sport*, *60*, 48–58. https://doi.org/10.1080/02701367.1989.10607413

Mellis, A. M., & Bickel, W. K. (2020). Mechanical Turk data collection in addiction research: utility, concerns and best practices. *Addiction*, *115*, 1960–1968. https://doi.org/10.1111/add.15032

Mertens, N., Boen, F., Steffens, N. K., Cotterill, S. T., Haslam, S. A., & Fransen, K. (2020). Leading together towards a stronger 'us': An experimental test of the effectiveness of the 5R

Shared Leadership Program (5RS) in basketball teams. *Journal of Science and Medicine in Sport*, *23*, 770–775. https://doi.org/10.1016/j.jsams.2020.01.010

Mertens, N., Boen, F., Vande Broek, G., Vansteenkiste, M., & Fransen, K. (2018). An experiment on the impact of coaches' and athlete leaders' competence support on athletes' motivation and performance. *Scandinavian Journal of Medicine and Science in Sports*, *28*, 2734–2750. https://doi.org/10.1111/sms.13273

Miller, J. (2023). Outlier exclusion procedures for reaction time analysis: The cures are generally worse than the disease. *Journal of Experimental Psychology*, *152*, 3189–3217. https://doi.org/10.1037/xge0001450

Moksony, F. (1999). Small is beautiful. The use and interpretation of R2 in social research. *Szociológiai Szemle*.

Morgan, G. B., Hodge, K. J., & Baggett, A. R. (2016). Latent profile analysis with nonnormal mixtures: A Monte Carlo examination of model selection using fit indices. *Computational Statistics and Data Analysis*, *93*, 146–161. https://doi.org/10.1016/j.csda.2015.02.019

Morgan, P. B. C., Fletcher, D., & Sarkar, M. (2015). Understanding team resilience in the world's best athletes: A case study of a rugby union World Cup winning team. *Psychology of Sport and Exercise*, *16*, 91–100. https://doi.org/10.1016/j.psychsport.2014.08.007

Morin, A. J. S., Morizot, J., Boudrias, J.-S., & Madore, I. (2011). A Multifoci Person-Centered Perspective on Workplace Affective Commitment: A Latent Profile/Factor Mixture Analysis. *Organizational Research Methods*, *14*, 58–90. https://doi.org/10.1177/1094428109356476

Mossman, L. H., Slemp, G. R., Lewis, K. J., Colla, R. H., & O'Halloran, P. (2022). Autonomy support in sport and exercise settings: a systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*, 1–24. https://doi.org/10.1080/1750984X.2022.2031252

Mouratidis, A., Vansteenkiste, M., Lens, W., & Sideridis, G. (2008). The motivating role of positive feedback in sport and physical education: evidence for a motivational model. *Journal of Sport and Exercise Psychology*, *30*, 240–268. https://doi.org/10.1123/jsep.30.2.240

Muley, P., Wadikar, S. S., & Muley, P. (2016). Effect of exam Stress on reaction time in medical students. *Indian Journal of Basic and Applied Medical Research*, *5*, 733–739.

Murray, R. M., Hartley, C., & Coffee, P. (2023). Only my group will do: Evidence that social support protects athletes from burnout when they identify with those who provide it.

Psychology of Sport and Exercise, *69*, 102508. https://doi.org/10.1016/j.psychsport.2023.102508

Muthen, B., & Muthen, L. K. (2000). Integrating person-centered and variable-centered analyses: growth mixture modeling with latent trajectory classes. *Alcoholism, Clinical and Experimental Research*, *24*, 882–891.

Muthén, B., & Muthén, L. K. (2011). Mplus version 6.12.

Muthén, L. K., & Muthén, B. O. (2002). How to Use a Monte Carlo Study to Decide on Sample Size and Determine Power. *Structural Equation Modeling: A Multidisciplinary Journal*, *9*, 599–620. https://doi.org/10.1207/S15328007SEM0904_8

Myers, N. D., Ntoumanis, N., Gunnell, K. E., Gucciardi, D. F., & Lee, S. (2018). A review of some emergent quantitative analyses in sport and exercise psychology. *International Review of Sport and Exercise Psychology*, *11*, 70–100. https://doi.org/10.1080/1750984X.2017.1317356

Neys, J. L. D., Jansz, J., & Tan, E. S. H. (2014). Exploring persistence in gaming: The role of self-determination and social identity. *Computers in Human Behavior*, *37*, 196–209. https://doi.org/10.1016/j.chb.2014.04.047

Ng, J. Y. Y., Lonsdale, C., & Hodge, K. (2011). The Basic Needs Satisfaction in Sport Scale (BNSSS): Instrument development and initial validity evidence. *Psychology of Sport and Exercise*, *12*, 257–264. https://doi.org/10.1016/j.psychsport.2010.10.006

Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science*, *7*, 325–340. https://doi.org/10.1177/1745691612447309

Nijstad, B. A., Stroebe, W., & Lodewijkx, H. F. M. (2006). The illusion of group productivity: a reduction of failures explanation. *European Journal of Social Psychology*, *36*, 31–48. https://doi.org/10.1002/ejsp.295

No, U., & Hong, S. (2018). A Comparison of Mixture Modeling Approaches in Latent Class Models With External Variables Under Small Samples. *Educational and Psychological Measurement*, *78*, 925–951. https://doi.org/10.1177/0013164417726828

Norm O'Rourke, P. D., & Larry Hatcher, P. D. (2019, June 6). *A Step-By-Step Approach to Using SAS for Factor Analysis and Structural Equation Modeling, Second Edition*. SAS Institute.

Novelli, D., Drury, J., Reicher, S., & Stott, C. (2013). Crowdedness mediates the effect of social identification on positive emotion in a crowd: a survey of two crowd events. *PloS One*, *8*, e78983. https://doi.org/10.1371/journal.pone.0078983

Ntoumanis, N. (2001). A self-determination approach to the understanding of motivation in physical education. *The British Journal of Educational Psychology*, *71*, 225–242. https://doi.org/10.1348/000709901158497

Ntoumanis, N. (2002). Motivational clusters in a sample of British physical education classes. *Psychology of Sport and Exercise*, *3*, 177–194. https://doi.org/10.1016/s1469-0292(01)00020-6

Ntoumanis, N., Stenling, A., Thøgersen-Ntoumani, C., Vlachopoulos, S., Lindwall, M., Gucciardi, D. F., & Tsakonitis, C. (2018). Longitudinal associations between exercise identity and exercise motivation: A multilevel growth curve model approach. *Scandinavian Journal of Medicine and Science in Sports*, *28*, 746–753. https://doi.org/10.1111/sms.12951

Ntoumanis, N., Thøgersen-Ntoumani, C., Quested, E., & Hancox, J. (2017). The effects of training group exercise class instructors to adopt a motivationally adaptive communication style. *Scandinavian Journal of Medicine and Science in Sports*, *27*, 1026–1034. https://doi.org/10.1111/sms.12713

Ntoumanis, N., Ng, J. Y. Y., Prestwich, A., Quested, E., Hancox, J. E., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Lonsdale, C., & Williams, G. C. (2021). A meta-analysis of self-determination theory-informed intervention studies in the health domain: effects on motivation, health behavior, physical, and psychological health. *Health Psychology Review*, *15*, 214–244. https://doi.org/10.1080/17437199.2020.1718529

Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*, 535–569. https://doi.org/10.1080/10705510701575396

Nylund-Gibson, K., Garber, A. C., Carter, D. B., Chan, M., Arch, D. A. N., Simon, O., Whaling, K., Tartt, E., & Lawrie, S. I. (2023). Ten frequently asked questions about latent transition analysis. *Psychological Methods*, *28*, 284–300. https://doi.org/10.1037/met0000486

Nylund-Gibson, K., Grimm, R., Quirk, M., & Furlong, M. (2014). A Latent Transition Mixture Model Using the Three-Step Specification. *Structural Equation Modeling: A Multidisciplinary Journal*, *21*, 439–454. https://doi.org/10.1080/10705511.2014.915375

Oga-Baldwin, W. L. Q., & Fryer, L. K. (2018). Schools can improve motivational quality: Profile transitions across early foreign language learning experiences. *Motivation and Emotion*, *42*, 527–545. https://doi.org/10.1007/s11031-018-9681-7

Okimoto, T. G., & Wrzesniewski, A. (2012). Effort in the face of difference: Feeling like a non-prototypical group member motivates effort. *European Journal of Social Psychology*, *42*, 628–639. https://doi.org/10.1002/ejsp.1877

Olafsen, A. H., Deci, E. L., & Halvari, H. (2018). Basic psychological needs and work motivation: A longitudinal test of directionality. *Motivation and Emotion*, *42*, 178–189. https://doi.org/10.1007/s11031-017-9646-2

Olafsen, A. H., Niemiec, C. P., Halvari, H., Deci, E. L., & Williams, G. C. (2017). On the dark side of work: a longitudinal analysis using self-determination theory. *European Journal of Work and Organizational Psychology*, *26*, 275–285. https://doi.org/10.1080/1359432X.2016.1257611

Olafsen, A. H., Halvari, H., & Frølund, C. W. (2021). The basic psychological need satisfaction and need frustration at work scale: A validation study. *Frontiers in Psychology*, *12*, 697306. https://doi.org/10.3389/fpsyg.2021.697306

Ouwerkerk, J. W., de Gilder, D., & de Vries, N. K. (2000). When the going gets tough, the tough get going: Social identification and individual effort in intergroup competition. *Personality and Social Psychology Bulletin*, *26*, 1550–1559. https://doi.org/10.1177/01461672002612009

Pacewicz, C. E., Rowley, T. W., & Savage, J. L. (2023). Physical activity and the link among stress, burnout, and well-being in athletic trainers. *Journal of Athletic Training*, *58*, 374–380. https://doi.org/10.4085/1062-6050-0160.22

Pain, M., & Harwood, C. (2009). Team building through mutual sharing and open discussion of team functioning. *The Sport Psychologist*, *23*, 523–542. https://doi.org/10.1123/tsp.23.4.523

Palan, S., & Schitter, C. (2018). Prolific.ac—A subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, *17*, 22–27. https://doi.org/10.1016/j.jbef.2017.12.004

Parker, S. L., Dawson, N., Van den Broeck, A., Sonnentag, S., & Neal, A. (2021). Employee motivation profiles, energy levels, and approaches to sustaining energy: A two-wave

latent-profile analysis. *Journal of Vocational Behavior*, *131*, 103659. https://doi.org/10.1016/j.jvb.2021.103659

Peer, E., Rothschild, D., Gordon, A., Evernden, Z., & Damer, E. (2022). Data quality of platforms and panels for online behavioral research. *Behavior Research Methods*, *54*, 1643–1662. https://doi.org/10.3758/s13428-021-01694-3

Pelletier, L. G., Rocchi, M. A., Vallerand, R. J., Deci, E. L., & Ryan, R. M. (2013). Validation of the revised sport motivation scale (SMS-II). *Psychology of Sport and Exercise*, *14*, 329–341. https://doi.org/10.1016/j.psychsport.2012.12.002

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry*, *18*, 189–193. https://doi.org/10.1097/00001504-200503000-00013

Peters, K., Tevichapong, P., & Alexander Haslam, S. (2010). Making the Organization Fly: Organizational Identification and Citizenship in Full-Service and Low-Cost Airlines. *Journal of Personnel Psychology*, *9*, 145–148. https://doi.org/10.1027/1866-5888/a000013

Platow, M. J., & Grace, D. M. (2020). Comparing the social identity approach with self-determination theory. In S. A. Haslam, K. Fransen, & F. Boen (Eds.), *The new psychology of sport and exercise: The social identity approach* (pp. 343–359). Sage Publications Ltd.

Platow, M. J., Hunter, J. A., Branscombe, N. R., & Grace, D. M. (2014). Social Creativity in Olympic Medal Counts: Observing the Expression of Ethnocentric Fairness. *Social Justice Research*, *27*, 283–304. https://doi.org/10.1007/s11211-014-0219-1

Postmes, T., Haslam, S. A., & Jans, L. (2013). A single-item measure of social identification: Reliability, validity, and utility. *The British Journal of Social Psychology*, *52*, 597–617. https://doi.org/10.1111/bjso.12006

Postmes, T., Wichmann, L. J., van Valkengoed, A. M., & van der Hoef, H. (2019). Social identification and depression: A meta-analysis. *European Journal of social Psychology*, *49*, 110–126. https://doi.org/10.1002/ejsp.2508

Quested, E., Ntoumanis, N., Viladrich, C., Haug, E., Ommundsen, Y., Van Hoye, A., Mercé, J., Hall, H. K., Zourbanos, N., & Duda, J. L. (2013). Intentions to drop-out of youth soccer: A test of the basic needs theory among European youth from five countries. *International*

Journal of Sport and Exercise Psychology, *11*, 395–407. https://doi.org/10.1080/1612197x.2013.830431

Raedeke, T. D. (1997). Is athlete burnout more than just stress? A sport commitment perspective. *Journal of Sport and Exercise Psychology*, *19*, 396–417.

Raedeke, T. D., & Smith, A. L. (2001). Development and preliminary validation of an athlete burnout measure. *Journal of Sport and Exercise Psychology*, *23*, 281–306. https://doi.org/10.1123/jsep.23.4.281

Raedeke, T. D., & Smith, A. L. (2004). Coping resources and athlete burnout: An examination of stress mediated and moderation hypotheses. *Journal of Sport and Exercise Psychology*, *26*, 525.

Reed-Fitzke, K., & Lucier-Greer, M. (2021). Basic psychological need satisfaction and frustration: Profiles among emerging adult college students and links to well-being. *Contemporary Family Therapy*, *43*, 20–34. https://doi.org/10.1007/s10591-020-09550-w

Rees, T., Alexander Haslam, S., Coffee, P., & Lavallee, D. (2015). A social identity approach to sport psychology: Principles, practice, and prospects. *Sports Medicine*, *45*, 1083–1096. https://doi.org/10.1007/s40279-015-0345-4

Rees, T., Green, J., Peters, K., Stevens, M., Haslam, S. A., James, W., & Timson, S. (2022). Multiple group memberships promote health and performance following pathway transitions in junior elite cricket. *Psychology of Sport and Exercise*, *60*, 102159. https://doi.org/10.1016/j.psychsport.2022.102159

Rees, T., Salvatore, J., Coffee, P., Haslam, S. A., Sargent, A., & Dobson, T. (2013). Reversing downward performance spirals. *Journal of Experimental Social Psychology*, *49*, 400–403. https://doi.org/10.1016/j.jesp.2012.12.013

Reeve, J., & Lee, W. (2014). Students' classroom engagement produces longitudinal changes in classroom motivation. *Journal of Educational Psychology*, *106*, 527–540. https://doi.org/10.1037/a0034934

Reinboth, M., & Duda, J. L. (2006). Perceived motivational climate, need satisfaction and indices of well-being in team sports: A longitudinal perspective. *Psychology of Sport and Exercise*, *7*, 269–286. https://doi.org/10.1016/j.psychsport.2005.06.002

Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. M. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin*, *26*, 419–435. https://doi.org/10.1177/0146167200266002

Reysen, S., Katzarska-Miller, I., Nesbit, S. M., & Pierce, L. (2013). Further validation of a single-item measure of social identification. *European Journal of Social Psychology*. https://doi.org/10.1002/ejsp.1973

Roberti, J. W., Harrington, L. N., & Storch, E. A. (2006). Further psychometric support for the 10-item version of the Perceived Stress Scale. *Journal of College Counseling*, *9*, 135–147. https://doi.org/10.1002/j.2161-1882.2006.tb00100.x

Rosenberg, J. M. (2018). *Introduction to tidyLPA*.

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, *48*, 1–36. https://doi.org/10.18637/jss.v048.i02.

Rouse, P. C., Turner, P. J. F., Siddall, A. G., Schmid, J., Standage, M., & Bilzon, J. L. J. (2020). The interplay between psychological need satisfaction and psychological need frustration within a work context: A variable and person-oriented approach. *Motivation and Emotion*, *44*, 175–189. https://doi.org/10.1007/s11031-019-09816-3

Ryan, R., & Deci, E. (2007). Active human nature. In M. Hagger & N. Chatzisarantis (Eds.), *Intrinsic Motivation and Self-determination in Exercise and Sport* (pp. 1–22). Human Kinetics.

Ryan, R., Williams, G. C., Patrick, H., & Deci, E. (2009). Self-determination theory and physical activity: The dynamics of motivation in development and wellness. *Hellenic Journal of Psychology*, *6*, 107.

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality*, *63*, 397–427. https://doi.org/10.1111/j.1467-6494.1995.tb00501.x

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*, 54–67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist*, *55*, 68–78. https://doi.org/10.1037//0003-066x.55.1.68

Ryan, R. (2009). Self determination theory and well being. *Social Psychology*, *84*, 848.

Ryan, R. M. (1982). Control and information in the intrapersonal sphere: An extension of cognitive evaluation theory. *Journal of Personality and Social Psychology*, *43*, 450–461. https://doi.org/10.1037//0022-3514.43.3.450

Ryan, R. M. (2023). *The Oxford Handbook of Self-Determination Theory*. Oxford University Press.

Ryan, R. M., Bernstein, J. H., & Brown, K. W. (2010). Weekends, work, and well-being: Psychology need satisfaction and day of the week effects on mood, vitality, and physical symptoms. *Journal of Social and Clinical Psychology*, *29*, 95–122. https://doi.org/10.1521/jscp.2010.29.1.95

Ryan, R. M., & Deci, E. L. (2000c). The Darker and Brighter Sides of Human Existence: Basic Psychological Needs as a Unifying Concept. *Psychological inquiry*, *11*, 319–338. https://doi.org/10.1207/S15327965PLI1104_03

Ryan, R. M., & Deci, E. L. (2003). On assimilating identities to the self: A self-determination theory perspective on internalization and integrity within cultures. In M. R. Leary (Ed.), *Handbook of self and identity* (pp. 253–272, Vol. 703). The Guilford Press.

Ryan, R. M., & Deci, E. L. (2008). A self-determination theory approach to psychotherapy: The motivational basis for effective change. *Canadian Psychology*, *49*, 186.

Ryan, R. M., & Deci, E. L. (2012). *Handbook of self and identity*. Guilford Press New York, NY.

Ryan, R. M., & Deci, E. L. (2017a). Self-Determination Theory: An Introduction and Overview. In R. M. Ryan & E. L. Deci (Eds.), *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness.* (pp. 3–25). Guildford Press.

Ryan, R. M., & Deci, E. L. (2017b, February 14). *Self-Determination Theory: Basic Psychological Needs in Motivation, Development, and Wellness*. Guilford Publications. https://doi.org/10.1521/978.14625/28806

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Šakan, D., Žuljević, D., & Rokvić, N. (2020). The Role of Basic Psychological Needs in Well-Being During the COVID-19 Outbreak: A Self-Determination Theory Perspective. *Frontiers in Public Health*, *8*, 583181. https://doi.org/10.3389/fpubh.2020.583181

Sallis, J. F., Bull, F., Guthold, R., Heath, G. W., Inoue, S., Kelly, P., Oyeyemi, A. L., Perez, L. G., Richards, J., & Hallal, P. C. (2016). Progress in physical activity over the Olympic quadrennium. *The Lancet*, *388*, 1325–1336. https://doi.org/10.1016/S0140-6736(16)30581-5

Sánchez-Miguel, P. A., Leo, F. M., Sánchez-Oliva, D., Amado, D., & García-Calvo, T. (2013). The importance of parents' behavior in their children's enjoyment and amotivation in sports. *Journal of Human Kinetics*, *36*, 169–177. https://doi.org/10.2478/hukin-2013-0017

Sankaran, S. (2012, May 1). *Applications of nanomaterials in agricultural production and crop protection: A review*. https://doi.org/10.1016/J.CROPRO.2012.01.007

Santana-Monagas, E., & Núñez, J. L. (2022). Predicting students' basic psychological need profiles through motivational appeals: Relations with grit and well-being. *Learning and Individual Differences*, *97*, 102162. https://doi.org/10.1016/j.lindif.2022.102162

Saward, C., Harrison, D., Healy, L., & Sarkar, M. (2024). Motivational profiles and their relation to wellbeing, burnout, and drop-out intentions in university football players in the UK: A mixed methods approach. *Psychology of Sport and Exercise*, *71*, 102585. https://doi.org/10.1016/j.psychsport.2023.102585

Sawyer, S. F. (2009). Analysis of Variance: The Fundamental Concepts. *The Journal of Manual and Manipulative Therapy*, *17*, 27E–38E. https://doi.org/10.1179/jmt.2009.17.2.27E

Schat, A. C. H., Kelloway, E. K., & Desmarais, S. (2005). The Physical Health Questionnaire (PHQ): Construct validation of a self-report scale of somatic symptoms. *Journal of Occupational Health Psychology*, *10*, 363–381. https://doi.org/10.1037/1076-8998.10.4.363

Schermelleh-Engel, K., Moosbrugger, H., & Müller, H. (2003). Evaluating the Fit of Structural Equation Models: Tests of Significance and Descriptive Goodness-of-Fit Measures. *Methods of Psychological Research Online*, *8*, 23–74.

Schertzinger, M., Neville, F., & Ozakinci, G. (2021). Social processes and well-being for runners within the UK during the COVID-19 lockdown: Oral Presentation B1.7. *The Health & Fitness Journal of Canada*, *14*. https://doi.org/10.14288/hfjc.v14i3.485

Schertzinger, M. M. (2023, June 16). *Using self-determination theory and the social identity approach to understand physical activity during the COVID-19 pandemic*. The University of St Andrews. https://doi.org/10.17630/STA/488

Schuler, J., Wegner, M., & Knechtle, B. (2014). Implicit motives and basic need satisfaction in extreme endurance sports. *Journal of Sport and Exercise Psychology*, *36*, 293–302. https://doi.org/10.1123/jsep.2013-0191

Schultz, P. P., Ryan, R. M., Niemiec, C. P., Legate, N., & Williams, G. C. (2015). Mindfulness, work climate, and psychological need satisfaction in employee well-being. *Mindfulness*, *6*, 971–985. https://doi.org/10.1007/s12671-014-0338-7

Schumacher Dimech, A., & Seiler, R. (2011). Extra-curricular sport participation: A potential buffer against social anxiety symptoms in primary school children. *Psychology of Sport and Exercise*, *12*, 347–354. https://doi.org/10.1016/j.psychsport.2011.03.007

Seligman, M. E. P. (1972). Learned Helplessness. *Annual Review of Medicine*, *23*, 407–412. https://doi.org/10.1146/annurev.me.23.020172.002203

Shannon, S., Prentice, G., & Breslin, G. (2021). Athletes' psychological needs and coaches' interpersonal behaviors: A within-person latent profile analysis. *Journal of Sport and Exercise Psychology*, *43*, 71–82. https://doi.org/10.1123/jsep.2019-0295

Sheldon, K. M., & Bettencourt, A. B. (2002). Psychological need-satisfaction and subjective well-being within social groups. *British Journal of Social Psychology*, *41*, 25–38.

Sheldon, K. M., & Krieger, L. S. (2004). Does legal education have undermining effects on law students? Evaluating changes in motivation, values, and well-being. *Behavioral Sciences and the Law*, *22*, 261–286. https://doi.org/10.1002/bsl.582

Sheldon, K. M., Zhaoyang, R., & Williams, M. J. (2013). Psychological need-satisfaction, and basketball performance. *Psychology of Sport and Exercise*, *14*, 675–681. https://doi.org/10.1016/j.psychsport.2013.05.006

Shinde, P. C., Pazare, P. A., & Patil, P. D. Y. (2014). Effect of distraction on Choice Reaction Time in normal females and males. *World Journal of Pharmaceutical Research*, *3*, 362–371.

Sidanius, J., Pratto, F., van Laar, C., & Levin, S. (2004). Social dominance theory: Its agenda and method. *Political Psychology*, *25*, 845–880. https://doi.org/10.1111/j.1467-9221.2004.00401.x

Sinha, P., Calfee, C. S., & Delucchi, K. L. (2021). Practitioner's Guide to Latent Class Analysis: Methodological Considerations and Common Pitfalls. *Critical Care Medicine*, *49*, e63–e79. https://doi.org/10.1097/CCM.0000000000004710

Skinner, B. F. (1937). Two types of conditioned reflex: A reply to Konorski and Miller. *The Journal of General Psychology*, *16*, 272–279. https://doi.org/10.1080/00221309.1937.9917951

Slater, M. J., & Barker, J. B. (2019). Doing social identity leadership: Exploring the efficacy of an identity leadership intervention on perceived leadership and mobilization in elite disability soccer. *Journal of Applied Sport Psychology*, *31*, 65–86. https://doi.org/10.1080/10413200.2017.1410255

Slater, M. J., Evans, A. L., & Barker, J. B. (2013). Using social identities to motivate athletes towards peak performance at the London 2012 Olympic Games: reflecting for Rio 2016. *Reflective Practice*, *14*, 672–679. https://doi.org/10.1080/14623943.2013.835725

Slater, M. J., Haslam, S. A., & Steffens, N. K. (2018). Singing it for "us": Team passion displayed during national anthems is associated with subsequent success. *European Journal of Sport Science*, *18*, 541–549. https://doi.org/10.1080/17461391.2018.1431311

Sonderlund, A. L., Morton, T. A., & Ryan, M. K. (2017). Multiple Group Membership and Well-Being: Is There Always Strength in Numbers? *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01038

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior*, *120*, 103445. https://doi.org/10.1016/j.jvb.2020.103445

Standage, M., Duda, J. L., & Ntoumanis, N. (2003). A model of contextual motivation in physical education: Using constructs from self-determination and achievement goal theories to predict physical activity intentions. *Journal of Educational Psychology*, *95*, 97–110. https://doi.org/10.1037/0022-0663.95.1.97

Steffens, N. K., Haslam, S. A., Schuh, S. C., Jetten, J., & van Dick, R. (2017). A meta-analytic review of social identification and health in organizational contexts. *Personality and Social Psychology Review*, *21*, 303–335. https://doi.org/10.1177/1088868316656701

Steffens, N. K., LaRue, C. J., Haslam, C., Walter, Z. C., Cruwys, T., Munt, K. A., Haslam, S. A., Jetten, J., & Tarrant, M. (2021). Social identification-building interventions to improve health: a systematic review and meta-analysis. *Health Psychology Review*, *15*, 85–112. https://doi.org/10.1080/17437199.2019.1669481

Steiger, J. H. (2016). Notes on the Steiger–Lind (1980) Handout. *Structural Equation Modeling: A Multidisciplinary Journal*, *23*, 777–781. https://doi.org/10.1080/10705511.2016.1217487

Stephan, W. G., Stephan, C. W., & Gudykunst, W. B. (1999). Anxiety in intergroup relations: a comparison of anxiety/uncertainty management theory and integrated threat theory.

International Journal of Intercultural Relations, *23*, 613–628. https://doi.org/10.1016/S0147-1767(99)00012-7

Stets, J. E., & Burke, P. J. (2000). Identity theory and social identity theory. *Social Psychology Quarterly*, *63*, 224–237.

Stevens, M., Cruwys, T., Rees, T., Haslam, S. A., Boen, F., & Fransen, K. (2020). Physical activity. In S. A. Haslam, F. Boen, & K. Fransen (Eds.), *The new psychology of sport and exercise: The social identity approach* (pp. 167–186). Sage Publications Ltd.

Stevens, M., Rees, T., Coffee, P., Haslam, S. A., Steffens, N. K., & Polman, R. (2018). Leaders promote attendance in sport and exercise sessions by fostering social identity. *Scandinavian Journal of Medicine and Science in Sports*, *28*, 2100–2108. https://doi.org/10.1111/sms.13217

Stevens, M., Davies, O., & Cruwys, T. (2023). The effect of descriptive norms on exercise output and exertion during a video-guided workout. *Sport, Exercise, and Performance Psychology.* https://doi.org/10.1037/spy0000329

Stevens, M., Rees, T., Coffee, P., Steffens, N. K., Haslam, S. A., & Polman, R. (2017). A social identity approach to understanding and promoting physical activity. *Sports Medicine*, *47*, 1911–1918. https://doi.org/10.1007/s40279-017-0720-4

Stevens, M., Rees, T., Coffee, P., Steffens, N. K., Haslam, S. A., & Polman, R. (2020). Leading us to be active: A two-wave test of relationships between identity leadership, group identification, and attendance. *Sport, Exercise, and Performance Psychology*, *9*, 128–142. https://doi.org/10.1037/spy0000164

Stevens, M., Rees, T., & Polman, R. (2019). Social identification, exercise participation, and positive exercise experiences: Evidence from parkrun. *Journal of Sports Sciences*, *37*, 221–228. https://doi.org/10.1080/02640414.2018.1489360

Stine, R. A. (1995). Graphical Interpretation of Variance Inflation Factors. *The American Statistician*, *49*, 53–56. https://doi.org/10.2307/2684812

Stoet, G. (2010). PsyToolkit: A software package for programming psychological experiments using Linux. *Behavior Research Methods*, *42*, 1096–1104. https://doi.org/10.3758/BRM.42.4.1096

Stoet, G. (2017). PsyToolkit: A novel web-based method for running online questionnaires and reaction-time experiments. *Teaching of Psychology*, *44*, 24–31. https://doi.org/10.1177/0098628316677643

Strachan, S. M., Shields, C. A., Glassford, A., & Beatty, J. (2012). Role and group identity and adjustment to the possibility of running group disbandment. *Psychology of Sport and Exercise*, *13*, 436–443. https://doi.org/10.1016/j.psychsport.2012.01.007

Sylvester, B. D., Standage, M., McEwan, D., Wolf, S. A., Lubans, D. R., Eather, N., Kaulius, M., Ruissen, G. R., Crocker, P. R. E., Zumbo, B. D., & Beauchamp, M. R. (2016). Variety support and exercise adherence behavior: experimental and mediating effects. *Journal of Behavioral Medicine*, *39*, 214–224. https://doi.org/10.1007/s10865-015-9688-4

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Tajfel, H. (1974). Social identity and intergroup behaviour. *Social Sciences Information*, *13*, 65–93. https://doi.org/10.1177/053901847401300204

Tajfel, H. (1978). Interindividual behaviour and intergroup behaviour. In H. Tajfel (Ed.), *Differentiation between social groups* (pp. 27–60). Academic Press.

Tajfel, H., Billig, M. G., Bundy, R. P., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology*, *1*, 149–178. https://doi.org/10.1002/ejsp.2420010202

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In M. J. Hatch & M. Schultz (Eds.), *Organizational identity: A reader* (pp. 33–47, Vol. 1st edition). Oxford University Press.

Tajfel, H., & Turner, J. C. (2004). The social identity theory of intergroup behavior. In *Political psychology* (pp. 276–293). Psychology Press. https://doi.org/10.4324/9780203505984-16

Tang, M., Wang, D., & Guerrien, A. (2021). The Contribution of Basic Psychological Need Satisfaction to Psychological Well-Being via Autonomous Motivation Among Older Adults: A Cross-Cultural Study in China and France. *Frontiers in Psychology*, *12*, 734461. https://doi.org/10.3389/fpsyg.2021.734461

Tarrant, M., & Butler, K. (2011). Effects of self-categorization on orientation towards health. *The British Journal of Social Psychology*, *50*, 121–139. https://doi.org/10.1348/014466610X511645

Taylor, I. (2015). The five self-determination mini-theories applied to sport. In S. Mellalieu & S. Hanton (Eds.), *Contemporary advances in sport psychology* (pp. 68–90). Routledge.

Teixeira, P. J., Carraca, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. *The International Journal of Behavioral Nutrition and Physical Activity*, *9*, 78. https://doi.org/10.1186/1479-5868-9-78

Terry, D. J. (2002). Intergroup relations and organizational mergers. In M. A. Hogg & D. J. Terry (Eds.), *Social identity processes in organizational contexts* (pp. 229–247). Psychology Press.

Terry, D. J., Carey, C. J., & Callan, V. J. (2001). Employee Adjustment to an Organizational Merger: An Intergroup Perspective. *Personality and Social Psychology Bulletin*, *27*, 267–280. https://doi.org/10.1177/0146167201273001

Terry, D. J., & Hogg, M. A. (1996). Group Norms and the Attitude-Behavior Relationship: A Role for Group Identification. *Personality and Social Psychology Bulletin*, *22*, 776–793. https://doi.org/10.1177/0146167296228002

Thomas, E. F., Amiot, C. E., Louis, W. R., & Goddard, A. (2017). Collective self-determination: How the agent of help promotes pride, well-being, and support for intergroup helping. *Personality and Social Psychology Bulletin*, *43*, 662–677. https://doi.org/10.1177/0146167217695553

Thomas, W. E., Brown, R., Easterbrook, M. J., Vignoles, V. L., Manzi, C., D'Angelo, C., & Holt, J. J. (2017). Social identification in sports teams: The role of personal, social, and collective identity motives. *Personality and Social Psychology Bulletin*, *43*, 508–523. https://doi.org/10.1177/0146167216689051

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*, 1–10. https://doi.org/10.1007/BF02291170

Turner, J. C. (2010). Towards a cognitive redefinition of the social group. In T. Postmes & N. R. Branscombe (Eds.), *Rediscovering social identity: Key readings* (pp. 210–234). Psychology Press.

Turner, J. C. (1982). Towards a cognitive redefinition of the social group. In H. Tajfel (Ed.), *Social identity and intergroup relations* (pp. 15–40). Cambridge University Press.

Turner, J. C., Hogg, M. A., Oakes, P., Reicher, S., & Wetherell, M. (1987). *Rediscovering the social group: a self-categorization theory*. Blackwell.

Turner, J. C., Oakes, P. J., Alexander Haslam, S., & McGarty, C. (1994). Self and Collective: Cognition and Social Context. *Personality and Social Psychology Bulletin*, *20*, 454–463. https://doi.org/10.1177/0146167294205002

Turner, M. J., Miller, A., Youngs, H., Barber, N., Brick, N. E., Chadha, N. J., Chandler, C., Coyle, M., Didymus, F. F., Evans, A. L., Jones, K., McCann, B., Meijen, C., & Rossato, C. J. L. (2022). "I must do this!": A latent profile analysis approach to understanding the role of irrational beliefs and motivation regulation in mental and physical health. *Journal of Sports Sciences*, *40*, 934–949. https://doi.org/10.1080/02640414.2022.2042124

Turner, R. W., Perrin, E. M., Coyne-Beasley, T., Peterson, C. J., & Skinner, A. C. (2015). Reported Sports Participation, Race, Sex, Ethnicity, and Obesity in US Adolescents From NHANES Physical Activity (PAQ_D). *Global Pediatric Health*, *2*, 2333794X15577944. https://doi.org/10.1177/2333794X15577944

Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology*, *72*, 1161–1176. https://doi.org/10.1037//0022-3514.72.5.1161

van Dick, R., Jost, S., Wagner, U., Lemmer, G., & Tissington, P. A. (2009). Group membership salience and task performance. *Journal of Managerial Psychology*, *24*, 609–626. https://doi.org/10.1108/02683940910989011

van Dick, R., Frenzel, S. B., Erkens, V. A., Häusser, J. A., Haslam, S. A., Mojzisch, A., Steffens, N. K., & Junker, N. M. (2023). Reduced loneliness mediates the effects of multiple group identifications on well-being. *The British Journal of Social Psychology*. https://doi.org/10.1111/bjso.12651

van Dick, R., & Haslam, S. A. (2012). Stress and well-being in the workplace: Support for key propositions from the social identity approach. In J. Jetten, C. Haslam, & S. A. Haslam (Eds.), *The social cure: Identity, health, and well-being.* (pp. 175–194, Vol. 390). London & New York: Psychology Press.

Van den Broeck, A., Ferris, D. L., Chang, C.-H., & Rosen, C. C. (2016). A review of self-determination theory's basic psychological needs at work. *Journal of Management*, *42*, 1195–1229. https://doi.org/10.1177/0149206316632058

Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work and Stress*, *22*, 277–294. https://doi.org/10.1080/02678370802393672

Van Knippenberg, D. (2000). Work Motivation and Performance: A Social Identity Perspective. *Applied Psychology*, *49*, 357–371. https://doi.org/10.1111/1464-0597.00020

Van Knippenberg, D., Van Dick, R., & Tavares, S. (2007). Social identity and social exchange: Identification, support, and withdrawal from the job. *Journal of Applied Social Psychology*, *37*, 457–477. https://doi.org/10.1111/j.1559-1816.2007.00168.x

VandenBos, G. R. (2015, May 1). *APA dictionary of psychology* (G. R. VandenBos, Ed.). American Psychological Association Books. https://doi.org/10.1037/14646-000

Vander Elst, T., Van den Broeck, A., De Witte, H., & De Cuyper, N. (2012). The mediating role of frustration of psychological needs in the relationship between job insecurity and work-related well-being. *Work and Stress*, *26*, 252–271. https://doi.org/10.1080/02678373.2012.703900

Vankov, I. I. (2023). The hazards of dealing with response time outliers. *Frontiers in Psychology*, *14*, 1220281. https://doi.org/10.3389/fpsyg.2023.1220281

Vansteenkiste, M., Lens, W., & Deci, E. L. (2006). Intrinsic Versus Extrinsic Goal Contents in Self-Determination Theory: Another Look at the Quality of Academic Motivation. *Educational Psychologist*, *41*, 19–31. https://doi.org/10.1207/s15326985ep4101_4

Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, *23*, 263–280. https://doi.org/10.1037/a0032359

Vansteenkiste, M., & Sheldon, K. M. (2006). There's nothing more practical than a good theory: integrating motivational interviewing and self-determination theory. *The British Journal of Clinical Psychology*, *45*, 63–82. https://doi.org/10.1348/014466505X34192

Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: the synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *Journal of Personality and Social Psychology*, *87*, 246–260. https://doi.org/10.1037/0022-3514.87.2.246

Veenstra, K., & Haslam, S. A. (2000). Willingness to participate in industrial protest: exploring social identification in context. *The British Journal of Social Psychology*, *39 (Pt 2)*, 153–172. https://doi.org/10.1348/014466600164390

Verkooijen, K. T., van Hove, P., & Dik, G. (2012). Athletic Identity and Well-Being among Young Talented Athletes who Live at a Dutch Elite Sport Center. *Journal of Applied Sport Psychology*, *24*, 106–113. https://doi.org/10.1080/10413200.2011.633153

Vermote, B., Waterschoot, J., Morbée, S., Van der Kaap-Deeder, J., Schrooyen, C., Soenens, B., Ryan, R., & Vansteenkiste, M. (2022). Do Psychological Needs Play a Role in Times of Uncertainty? Associations with Well-Being During the COVID-19 Crisis. *Journal of Happiness Studies*, *23*, 257–283. https://doi.org/10.1007/s10902-021-00398-x

Vlachopoulos, S. P., Karageorghis, C. I., & Terry, P. C. (2000). Motivation profiles in sport: a self-determination theory perspective. *Research Quarterly for Exercise and Sport*, *71*, 387–397. https://doi.org/10.1080/02701367.2000.10608921

Vrieze, S. I. (2012). Model selection and psychological theory: a discussion of the differences between the Akaike information criterion (AIC) and the Bayesian information criterion (BIC). *Psychological Methods*, *17*, 228–243. https://doi.org/10.1037/a0027127

Wang, C. K. J., & Liu, W. C. (2007). Promoting enjoyment in girls' physical education: The impact of goals, beliefs, and self-determination. *European Physical Education Review*, *13*, 145–164. https://doi.org/10.1177/1356336X07076875

Wang, J. C. K., Morin, A. J. S., Ryan, R. M., & Liu, W. C. (2016). Students' Motivational Profiles in the Physical Education Context. *Journal of Sport and Exercise Psychology*, *38*, 612–630. https://doi.org/10.1123/jsep.2016-0153

Wardenaar, K. J. (2021). Latent Profile Analysis in R: A tutorial and comparison to Mplus. https://doi.org/10.31234/osf.io/wzftr

Wegge, J., & Haslam, A. S. (2005). Improving work motivation and performance in brainstorming groups: The effects of three group goal-setting strategies. *European Journal of Work and Organizational Psychology*, *14*, 400–430. https://doi.org/10.1080/13594320500349961

Wegge, J., Van Dick, R., Fisher, G. K., Wecking, C., & Moltzen, K. (2006). Work motivation, organizational identification, and well-being in call centre work. *Work and Stress*, *20*, 60–83. https://doi.org/10.1080/02678370600655553

Weibel, A., Rost, K., & Osterloh, M. (2009). Pay for performance in the public sector - benefits and (hidden) costs. *Journal of Public Administration Research and Theory*, *20*, 387–412. https://doi.org/10.1093/jopart/mup009

Weinstein, N., & Ryan, R. M. (2010). When helping helps: Autonomous motivation for prosocial behavior and its influence on well-being for the helper and recipient. *Journal of Personality and Social Psychology*, *98*, 222–244. https://doi.org/10.1037/a0016984

Weller, B. E., Bowen, N. K., & Faubert, S. J. (2020). Latent Class Analysis: A Guide to Best Practice. *The Journal of Black Psychology*, *46*, 287–311. https://doi.org/10.1177/0095798420930932

Wheaton, B., Muthén, B., Alwin, D. F., & Summers, G. F. (1977). Assessing Reliability and Stability in Panel Models. *Sociological Methodology*, *8*, 84–136. https://doi.org/10.2307/270754

Williams, G. A., & Kibowski, F. (2016). Latent Class Analysis and Latent Profile Analysis. In L. A. Jason & D. S. Glenwick (Eds.), *Handbook of Methodological Approaches to Community-Based Research: Qualitative, Quantitative, and Mixed Methods* (pp. 143–152). Oxford Academic. https://doi.org/10.1093/med:psych/9780190243654.003.0015

Williams, L., & Gill, D. L. (1995). The role of perceived competence in the motivation of physical activity. *Journal of Sport and Exercise Psychology*, *17*, 363–378. https://doi.org/10.1123/jsep.17.4.363

Williams, N., Whipp, P. R., Jackson, B., & Dimmock, J. A. (2013). Relatedness Support and the Retention of Young Female Golfers. *Journal of Applied Sport Psychology*, *25*, 412–430. https://doi.org/10.1080/10413200.2012.749311

Willis, L., Reynolds, K. J., & Lee, E. (2019). Being well at work: The impact of organizational climate and social identity on employee stress and self-esteem over time. *European Journal of Work and Organizational Psychology*, *28*, 1–15. https://doi.org/10.1080/1359432X.2019.1587409

Woods, D. L., Wyma, J. M., Yund, E. W., Herron, T. J., & Reed, B. (2015). Age-related slowing of response selection and production in a visual choice reaction time task. *Frontiers in Human Neuroscience*, *9*, 193. https://doi.org/10.3389/fnhum.2015.00193

Worchel, S., Rothgerber, H., Day, E. A., Hart, D., & Butemeyer, J. (1998). Social identity and individual productivity within groups. *The British Journal of Social Psychology*, *37 (Pt 4)*, 389–413. https://doi.org/10.1111/j.2044-8309.1998.tb01181.x

Wright, M. J., & Jackson, R. C. (2007). Brain regions concerned with perceptual skills in tennis: an fMRI study. *International Journal of Psychophysiology*, *63*, 214–220. https://doi.org/10.1016/j.ijpsycho.2006.03.018

Wyke, S., Hunt, K., Gray, C. M., Fenwick, E., Bunn, C., Donnan, P. T., Rauchhaus, P., Mutrie, N., Anderson, A. S., Boyer, N., Brady, A., Grieve, E., White, A., Ferrell, C., Hindle, E., &

Treweek, S. (2015). *Football Fans in Training (FFIT): a randomised controlled trial of a gender-sensitised weight loss and healthy living programme for men – end of study report.* NIHR Journals Library. https://doi.org/10.3310/phr03020

Xiang, P., Agbuga, B., McBride, R. E., & Liu, J. (2016). Students' Perceived Relatedness in Middle School Physical Education. *Research Quarterly for Exercise and Sport*, *87*, A15.

Xiang, P., Ağbuğa, B., Liu, J., & McBride, R. E. (2017). Relatedness Need Satisfaction, Intrinsic Motivation, and Engagement in Secondary School Physical Education. *Journal of teaching in physical education: JTPE*, *36*, 340–352. https://doi.org/10.1123/jtpe.2017-0034

Xie, K., Vongkulluksn, V. W., Cheng, S.-L., & Jiang, Z. (2021). Examining high-school students' motivation change through a person-centered approach. *Journal of Educational Psychology*, *114*, 89–107. https://doi.org/10.1037/edu0000507

Xie, M., Huang, S., Ke, L., Wang, X., & Wang, Y. (2022). The Development of Teacher Burnout and the Effects of Resource Factors: A Latent Transition Perspective. *International Journal of Environmental Research and Public Health*, *19*. https://doi.org/10.3390/ijerph19052725

Yampolsky, M. A., & Amiot, C. E. (2013). Priming self-determined and non-self-determined group identification: Effects on well-being and ingroup bias. *Group Dynamics: Theory, Research, and Practice*, *17*, 137–149. https://doi.org/10.1037/a0032825

Yip, L., Thomas, E. F., Amiot, C., Louis, W. R., & McGarty, C. (2023). Autonomous Motives Foster Sustained Commitment to Action: Integrating Self-Determination Theory and the Social Identity Approach. *Personality & Social Psychology Bulletin*, 1461672221148396. https://doi.org/10.1177/01461672221148396

Zhao, S., Dong, Y., & Luo, J. (2022). Profiles of Teacher Professional Identity Among Student Teachers and Its Association With Mental Health. *Frontiers in Public Health*, *10*, 735811. https://doi.org/10.3389/fpubh.2022.735811

Zijlema, W. L., Stolk, R. P., Lowe, B., Rief, W., White, P. D., & Rosmalen, J. G. M. (2013). How to assess common somatic symptoms in large-scale studies: a systematic review of questionnaires. *Journal of Psychosomatic Research*, *74*, 459–468. https://doi.org/10.1016/j.jpsychores.2013.03.093

Ziv, G., & Lidor, R. (2021). Autonomy support and preference-performance dissociation in choice-reaction time tasks. *Human Movement Science*, *77*, 102786. https://doi.org/10.1016/j.humov.2021.102786

Appendix A.

Questionnaires Used in Study 1

Basic Psychological Need Satisfaction and Frustration at Work Scale

The following questions concern your feelings about your job during the PAST 4 WEEKS. Please indicate how much you agree with each of the following statements given your experiences at work using the scale provided.

	Strongly disagree			Neutral			Strongly agree
1. I have felt initiative and choice in the things I am undertaking at work.	1	2	3	4	5	6	7
2. I have sometimes felt excluded from the people I work with.	1	2	3	4	5	6	7
3. I feel confident that I can do things well on my job.	1	2	3	4	5	6	7
4. I care about my co-workers and they care about me.	1	2	3	4	5	6	7
5. Most of the things I do on my job feel like “I have to”.	1	2	3	4	5	6	7
6. When I am at work, I have serious doubts about whether I can do things well.	1	2	3	4	5	6	7
7. I can make the decisions I want about how I do my job.	1	2	3	4	5	6	7
8. People I work with are often cold and distant towards me.	1	2	3	4	5	6	7
9. At work I feel capable at what I do.	1	2	3	4	5	6	7
10. I feel forced to do many things on my job I wouldn’t choose to do.	1	2	3	4	5	6	7
11. I often feel disappointed with my performance in my job.	1	2	3	4	5	6	7
12. I feel connected with people at work.	1	2	3	4	5	6	7
13. I feel my choices on my job express who I really am.	1	2	3	4	5	6	7
14. When I am at work, I feel competent to achieve my goals.	1	2	3	4	5	6	7
15. I feel pressured to do too many things on my job.	1	2	3	4	5	6	7
16. At work, I feel close and connected with other people who are important to me.	1	2	3	4	5	6	7
17. I feel insecure about my abilities on my job.	1	2	3	4	5	6	7
18. My daily activities at work feel like a chain of obligations.	1	2	3	4	5	6	7
19. I feel I have been doing what really interests me in my job.	1	2	3	4	5	6	7
20. I often have the impression that people I spend time with at work dislike me.	1	2	3	4	5	6	7
21. In my job, I feel I can successfully complete even difficult tasks.	1	2	3	4	5	6	7
22. I feel the relationships I have at work are just superficial.	1	2	3	4	5	6	7
23. When I am working I feel like a failure because of the mistakes I make.	1	2	3	4	5	6	7
24. I experience a warm feeling with the people I spend time with at work.	1	2	3	4	5	6	7

Multi-component In-group Identification Scale

For each of the following statements, please indicate how true it is for you, using the following scale:

	Strongly disagree						Strongly agree
Solidarity							
1. I feel a bond with my team.	1	2	3	4	5	6	7
2. I feel solidarity with my team.	1	2	3	4	5	6	7
3. I feel committed to my team.	1	2	3	4	5	6	7
Satisfaction							
4. I am glad to be in my team	1	2	3	4	5	6	7
5. I think that my team have a lot to be proud of.	1	2	3	4	5	6	7
6. It is pleasant to be in my team.	1	2	3	4	5	6	7
7. Being in my team gives me a good feeling.	1	2	3	4	5	6	7
Centrality							
8. I often think about the fact that I am in my team.	1	2	3	4	5	6	7
9. The fact that I am in my team is an important part of my identity.	1	2	3	4	5	6	7
10. Being in my team is an important part of how I see myself.	1	2	3	4	5	6	7

Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

	Never	Almost Never	Sometimes	Fairly Often	Very Often
1. In the last month, how often have you been upset because of something that happened unexpectedly?	1	2	3	4	5
2. In the last month, how often have you felt that you were unable to control the important things in your life?	1	2	3	4	5
3. In the last month, how often have you felt nervous and "stressed"?	1	2	3	4	5
4. In the last month, how often have you felt confident about your ability to handle your personal problems?	1	2	3	4	5
5. In the last month, how often have you felt that things were going your way?	1	2	3	4	5
6. In the last month, how often have you found that you could not cope with all the things that you had to do?	1	2	3	4	5
7. In the last month, how often have you been able to control irritations in your life?	1	2	3	4	5
8. In the last month, how often have you felt that you were on top of things?	1	2	3	4	5
9. In the last month, how often have you been angered because of things that were outside of your control?	1	2	3	4	5
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	1	2	3	4	5

Appendix B.

Correlation Coefficients for Measurement Items Used in Study 1

Item	pss_1	pss_2	pss_3	pss_6	pss_9	pss_10	pss_4	pss_5	pss_7	pss_8	bpn_1	bpn_7	bpn_13	bpn_19	bpn_4	bpn_12	bpn_16	bpn_24	bpn_3	bpn_9	bpn_14
pss_1	1.00																				
pss_2	.59	1.00																			
pss_3	.58	.59	1.00																		
pss_6	.59	.59	.62	1.00																	
pss_9	.61	.60	.57	.56	1.00																
pss_10	.56	.57	.58	.61	.58	1.00															
pss_4	.63	.63	.57	.52	.58	.53	1.00														
pss_5	.58	.59	.55	.54	.60	.59	.55	1.00													
pss_7	.55	.54	.54	.51	.58	.57	.62	.58	1.00												
pss_8	.58	.61	.54	.60	.59	.60	.57	.61	.60	1.00											
bpn_1	-.17	-.24	-.09	-.21	-.13	-.14	-.18	-.08	-.13	-.17	1.00										
bpn_7	-.13	-.18	-.14	-.22	-.12	-.12	-.11	-.07	-.11	-.16	.50	1.00									
bpn_13	-.15	-.20	-.08	-.21	-.18	-.14	-.21	-.14	-.17	-.17	.52	.33	1.00								
bpn_19	-.12	-.24	-.11	-.20	-.19	-.10	-.24	-.15	-.18	-.17	.53	.35	.66	1.00							
bpn_4	-.12	-.17	-.14	-.19	-.21	-.16	-.15	-.16	-.23	-.22	.27	.28	.27	.24	1.00						
bpn_12	-.18	-.24	-.24	-.22	-.25	-.23	-.21	-.22	-.24	-.24	.29	.26	.29	.30	.74	1.00					
bpn_16	-.16	-.19	-.19	-.18	-.18	-.15	-.17	-.18	-.17	-.16	.33	.30	.35	.35	.71	.77	1.00				
bpn_24	-.14	-.22	-.22	-.21	-.20	-.19	-.19	-.19	-.22	-.21	.30	.24	.31	.32	.73	.80	.78	1.00			
bpn_3	-.13	-.23	-.16	-.22	-.14	-.13	-.11	-.12	-.16	-.17	.26	.33	.20	.24	.40	.39	.40	.34	1.00		
bpn_9	-.16	-.22	-.14	-.21	-.16	-.14	-.14	-.12	-.20	-.15	.19	.31	.16	.16	.37	.40	.39	.35	.78	1.00	
bpn_14	-.12	-.19	-.16	-.19	-.19	-.15	-.12	-.13	-.15	-.13	.33	.38	.34	.30	.40	.44	.45	.37	.64	.64	1.00
bpn_21	-.16	-.18	-.13	-.17	-.18	-.09	-.05	-.10	-.09	-.12	.24	.30	.22	.24	.28	.33	.36	.29	.68	.65	.58
bpn_5	.29	.21	.35	.31	.36	.25	.24	.25	.28	.33	-.20	-.24	-.25	-.32	-.21	-.22	-.20	-.24	-.13	-.08	-.16
bpn_10	.28	.34	.37	.37	.34	.30	.30	.27	.31	.29	-.24	-.31	-.19	-.25	-.30	-.36	-.30	-.32	-.30	-.25	-.30
bpn_15	.44	.38	.45	.39	.45	.40	.34	.39	.41	.39	-.16	-.24	-.11	-.20	-.15	-.25	-.16	-.21	-.22	-.17	-.18
bpn_18	.39	.35	.38	.41	.43	.36	.39	.36	.40	.43	-.33	-.32	-.30	-.34	-.23	-.25	-.22	-.22	-.24	-.21	-.25
bpn_2	.23	.32	.37	.31	.33	.33	.26	.26	.31	.32	-.12	-.22	-.08	-.13	-.41	-.49	-.37	-.44	-.31	-.34	-.30
bpn_8	.20	.28	.33	.23	.25	.27	.20	.23	.28	.28	-.10	-.17	-.08	-.07	-.49	-.54	-.43	-.49	-.35	-.36	-.33
bpn_20	.21	.24	.31	.28	.26	.32	.21	.25	.30	.32	-.06	-.13	-.03	.00	-.41	-.45	-.34	-.37	-.29	-.31	-.29
bpn_22	.23	.26	.32	.28	.30	.28	.24	.30	.38	.33	-.09	-.14	-.13	-.15	-.56	-.61	-.56	-.55	-.26	-.33	-.29
bpn_6	.26	.29	.32	.25	.29	.27	.20	.25	.24	.31	-.04	-.19	-.04	-.05	-.19	-.27	-.23	-.22	-.53	-.56	-.48
bpn_11	.23	.28	.27	.24	.22	.22	.18	.18	.17	.32	-.08	-.18	-.05	-.07	-.22	-.26	-.22	-.19	-.56	-.51	-.41
bpn_17	.24	.29	.28	.29	.27	.27	.21	.24	.20	.31	-.08	-.28	-.02	-.03	-.22	-.29	-.24	-.21	-.56	-.59	-.45
bpn_23	.21	.27	.26	.21	.22	.26	.12	.22	.23	.29	-.05	-.19	-.05	-.04	-.26	-.31	-.23	-.23	-.52	-.54	-.46
sid_1	-.14	-.20	-.20	-.20	-.23	-.22	-.20	-.20	-.23	-.22	.35	.25	.31	.31	.77	.81	.76	.81	.37	.39	.45
sid_2	-.18	-.25	-.20	-.22	-.28	-.23	-.22	-.21	-.24	-.25	.40	.23	.36	.35	.72	.77	.73	.78	.36	.35	.47
sid_3	-.18	-.23	-.22	-.21	-.24	-.21	-.22	-.18	-.24	-.20	.44	.31	.32	.40	.69	.76	.74	.72	.44	.42	.49
sid_4	-.23	-.29	-.26	-.25	-.30	-.30	-.25	-.22	-.28	-.29	.43	.30	.34	.37	.71	.76	.68	.74	.40	.37	.45
sid_5	-.14	-.23	-.14	-.17	-.26	-.13	-.16	-.15	-.24	-.23	.41	.29	.35	.35	.65	.64	.61	.66	.38	.37	.40
sid_6	-.22	-.30	-.24	-.25	-.30	-.27	-.23	-.24	-.31	-.30	.39	.33	.33	.31	.70	.75	.68	.74	.39	.38	.46
sid_7	-.20	-.28	-.26	-.24	-.27	-.23	-.21	-.23	-.25	-.26	.41	.30	.33	.35	.69	.75	.71	.79	.37	.32	.42
sid_8	-.09	-.10	-.07	-.08	-.12	-.06	-.14	-.06	-.10	-.09	.39	.18	.41	.38	.49	.57	.54	.63	.20	.20	.31
sid_9	-.05	-.03	-.09	-.06	-.09	-.04	-.12	-.05	-.10	-.03	.37	.22	.43	.43	.51	.55	.58	.61	.18	.19	.30
sid_10	-.12	-.14	-.15	-.12	-.17	-.12	-.17	-.10	-.15	-.18	.30	.20	.25	.28	.60	.66	.56	.64	.31	.29	.35
S.D.	1.06	1.10	1.05	1.10	1.09	.99	1.05	.98	1.05	1.07	1.51	1.46	1.52	1.68	1.39	1.47	1.51	1.43	1.10	1.20	1.19

Item	bpn_21	bpn_5	bpn_10	bpn_15	bpn_18	bpn_2	bpn_8	bpn_20	bpn_22	bpn_6	bpn_11	bpn_17	bpn_23	sid_1	sid_2	sid_3	sid_4	sid_5	sid_6	sid_7	sid_8	sid_9	sid_10
pss_1																							
pss_2																							
pss_3																							
pss_6																							
pss_9																							
pss_10																							
pss_4																							
pss_5																							
pss_7																							
pss_8																							
bpn_1																							
bpn_7																							
bpn_13																							
bpn_19																							
bpn_4																							
bpn_12																							
bpn_16																							
bpn_24																							
bpn_3																							
bpn_9																							
bpn_14																							
bpn_21	1																						
bpn_5	-.12	1.00																					
bpn_10	-.23	.50	1.00																				
bpn_15	-.14	.46	.56	1.00																			
bpn_18	-.21	.58	.58	.56	1.00																		
bpn_2	-.30	.31	.49	.42	.37	1.00																	
bpn_8	-.33	.24	.43	.31	.33	.65	1.00																
bpn_20	-.27	.16	.39	.30	.35	.63	.72	1.00															
bpn_22	-.19	.24	.40	.29	.37	.56	.55	.57	1.00														
bpn_6	-.49	.33	.42	.38	.37	.55	.53	.46	.36	1.00													
bpn_11	-.44	.30	.38	.29	.33	.45	.43	.40	.32	.70	1.00												
bpn_17	-.47	.22	.37	.35	.38	.45	.44	.41	.36	.77	.71	1.00											
bpn_23	-.51	.22	.37	.31	.30	.47	.49	.50	.38	.70	.65	.70	1.00										
sid_1	.33	-.23	-.35	-.21	-.28	-.48	-.53	-.44	-.64	-.27	-.22	-.26	-.28	1.00									
sid_2	.33	-.27	-.36	-.25	-.32	-.47	-.50	-.41	-.59	-.31	-.22	-.25	-.26	.90	1.00								
sid_3	.41	-.28	-.38	-.24	-.30	-.47	-.50	-.39	-.56	-.34	-.24	-.27	-.31	.85	.85	1.00							
sid_4	.36	-.30	-.41	-.27	-.32	-.52	-.54	-.46	-.58	-.33	-.26	-.28	-.32	.85	.84	.86	1.00						
sid_5	.38	-.22	-.30	-.19	-.28	-.41	-.46	-.38	-.51	-.26	-.19	-.19	-.25	.74	.76	.74	.78	1.00					
sid_6	.35	-.24	-.36	-.27	-.29	-.53	-.61	-.51	-.58	-.32	-.28	-.28	-.33	.81	.80	.77	.87	.77	1.00				
sid_7	.33	-.32	-.41	-.30	-.35	-.50	-.53	-.44	-.62	-.28	-.24	-.24	-.25	.84	.84	.82	.85	.75	.84	1.00			
sid_8	.26	-.20	-.17	-.10	-.21	-.24	-.29	-.23	-.41	-.11	-.07	-.11	-.12	.62	.65	.65	.64	.59	.61	.66	1.00		
sid_9	.19	-.25	-.23	-.10	-.21	-.24	-.24	-.18	-.40	-.06	-.02	-.04	-.09	.62	.61	.67	.64	.56	.56	.66	.75	1.00	
sid_10	.32	-.20	-.25	-.16	-.18	-.42	-.39	-.31	-.46	-.20	-.19	-.20	-.25	.69	.65	.68	.68	.58	.63	.67	.53	.60	1.00
S.D.	1.18	1.48	1.71	1.86	1.72	1.83	1.41	1.52	1.78	1.63	1.50	1.67	1.55	1.53	1.51	1.48	1.51	1.31	1.45	1.48	1.54	1.64	1.50

Appendix C.

Confirmatory Factor Analysis Outputs for Study 1

Basic psychological needs satisfaction and frustration scale

```
lavaan 0.6.17 ended normally after 52 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        56

  Number of observations                           281

Model Test User Model:
                                              Standard      Scaled
  Test Statistic                               292.396     265.543
  Degrees of freedom                               197         197
  P-value (Chi-square)                           0.000       0.001
  Scaling correction factor                                  1.101
    Satorra-Bentler correction

Model Test Baseline Model:

  Test statistic                              4113.588    3470.681
  Degrees of freedom                               231         231
  P-value                                        0.000       0.000
  Scaling correction factor                                  1.185

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    0.975       0.979
  Tucker-Lewis Index (TLI)                       0.971       0.975

  Robust Comparative Fit Index (CFI)                         0.980
  Robust Tucker-Lewis Index (TLI)                            0.977

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)              -9268.352   -9268.352
  Loglikelihood unrestricted model (H1)      -9122.154   -9122.154

  Akaike (AIC)                               18648.704   18648.704
  Bayesian (BIC)                             18852.452   18852.452
  Sample-size adjusted Bayesian (SABIC)      18674.878   18674.878

Root Mean Square Error of Approximation:

  RMSEA                                          0.042       0.035
  90 Percent confidence interval - lower         0.031       0.024
  90 Percent confidence interval - upper         0.051       0.045
  P-value H_0: RMSEA <= 0.050                    0.923       0.994
  P-value H_0: RMSEA >= 0.080                    0.000       0.000

  Robust RMSEA                                               0.037
  90 Percent confidence interval - lower                     0.024
  90 Percent confidence interval - upper                     0.048
  P-value H_0: Robust RMSEA <= 0.050                         0.977
  P-value H_0: Robust RMSEA >= 0.080                         0.000

Standardized Root Mean Square Residual:

  SRMR                                           0.058       0.058

Parameter Estimates:

  Standard errors                             Robust.sem
  Information                                   Expected
  Information saturated (h1) model          Structured

Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  aut_s =~
    bpn_1             0.917    0.111    8.272    0.000    1.161    0.771
    bpn_7             0.713    0.103    6.950    0.000    0.902    0.618
    bpn_13            0.756    0.107    7.061    0.000    0.957    0.628
    bpn_19            0.891    0.110    8.135    0.000    1.127    0.671
  aut_f =~
    bpn_5             0.628    0.081    7.765    0.000    0.953    0.637
    bpn_10            0.933    0.103    9.087    0.000    1.416    0.819
```

```
    bpn_15            0.874    0.102    8.604    0.000    1.326    0.705
  rel_s =~
    bpn_4             0.778    0.074   10.569    0.000    1.141    0.824
    bpn_12            0.894    0.081   10.994    0.000    1.311    0.899
    bpn_16            0.883    0.079   11.230    0.000    1.293    0.861
    bpn_24            0.857    0.076   11.222    0.000    1.255    0.886
  rel_f =~
    bpn_2             0.704    0.137    5.151    0.000    1.490    0.823
    bpn_8             0.526    0.106    4.975    0.000    1.114    0.795
    bpn_20            0.521    0.104    5.023    0.000    1.104    0.733
  com_s =~
    bpn_3             0.668    0.075    8.960    0.000    0.985    0.885
    bpn_9             0.716    0.077    9.264    0.000    1.056    0.872
    bpn_14            0.614    0.068    9.057    0.000    0.906    0.754
    bpn_21            0.621    0.073    8.541    0.000    0.915    0.768
  com_f =~
    bpn_6             0.916    0.098    9.330    0.000    1.419    0.881
    bpn_11            0.765    0.089    8.613    0.000    1.185    0.801
    bpn_17            0.912    0.100    9.099    0.000    1.414    0.856
    bpn_23            0.798    0.090    8.872    0.000    1.237    0.808
  sat =~
    aut_s             0.776    0.157    4.927    0.000    0.613    0.613
    com_s             1.084    0.199    5.447    0.000    0.735    0.735
    rel_s             1.071    0.172    6.223    0.000    0.731    0.731
  frs =~
    aut_f             1.142    0.194    5.886    0.000    0.752    0.752
    com_f             1.183    0.199    5.940    0.000    0.764    0.764
    rel_f             1.867    0.455    4.106    0.000    0.881    0.881

Covariances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
 .aut_s ~~
   .aut_f            -0.454    0.109   -4.151    0.000   -0.454   -0.454
 .com_s ~~
   .com_f            -0.873    0.062  -13.988    0.000   -0.873   -0.873
 .rel_s ~~
   .rel_f            -0.649    0.128   -5.076    0.000   -0.649   -0.649
 .bpn_13 ~~
   .bpn_19            0.619    0.149    4.149    0.000    0.619    0.419
 .bpn_8 ~~
   .bpn_20            0.287    0.103    2.775    0.006    0.287    0.329
  sat ~~
    frs              -0.620    0.054  -11.394    0.000   -0.620   -0.620

Variances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
   .bpn_1             0.919    0.200    4.598    0.000    0.919    0.406
   .bpn_7             1.316    0.159    8.263    0.000    1.316    0.618
   .bpn_13            1.402    0.174    8.046    0.000    1.402    0.605
   .bpn_19            1.551    0.208    7.466    0.000    1.551    0.550
   .bpn_5             1.328    0.138    9.604    0.000    1.328    0.594
   .bpn_10            0.986    0.141    6.975    0.000    0.986    0.330
   .bpn_15            1.780    0.209    8.512    0.000    1.780    0.503
   .bpn_4             0.614    0.105    5.829    0.000    0.614    0.320
   .bpn_12            0.406    0.061    6.691    0.000    0.406    0.191
   .bpn_16            0.583    0.080    7.273    0.000    0.583    0.259
   .bpn_24            0.432    0.055    7.884    0.000    0.432    0.215
   .bpn_2             1.058    0.179    5.922    0.000    1.058    0.323
   .bpn_8             0.722    0.112    6.421    0.000    0.722    0.367
   .bpn_20            1.051    0.188    5.605    0.000    1.051    0.463
   .bpn_3             0.268    0.037    7.307    0.000    0.268    0.216
   .bpn_9             0.350    0.056    6.279    0.000    0.350    0.239
   .bpn_14            0.622    0.106    5.866    0.000    0.622    0.431
   .bpn_21            0.584    0.079    7.417    0.000    0.584    0.411
   .bpn_6             0.580    0.094    6.193    0.000    0.580    0.224
   .bpn_11            0.787    0.103    7.611    0.000    0.787    0.359
   .bpn_17            0.728    0.117    6.210    0.000    0.728    0.267
   .bpn_23            0.813    0.091    8.919    0.000    0.813    0.347
   .aut_s             1.000                              0.624    0.624
   .aut_f             1.000                              0.434    0.434
   .rel_s             1.000                              0.466    0.466
   .rel_f             1.000                              0.223    0.223
   .com_s             1.000                              0.460    0.460
   .com_f             1.000                              0.417    0.417
    sat               1.000                              1.000    1.000
    frs               1.000                              1.000    1.000
```

R-Square:

	Estimate
bpn_1	0.594
bpn_7	0.382
bpn_13	0.395
bpn_19	0.450
bpn_5	0.406
bpn_10	0.670
bpn_15	0.497
bpn_4	0.680
bpn_12	0.809
bpn_16	0.741
bpn_24	0.785
bpn_2	0.677
bpn_8	0.633
bpn_20	0.537
bpn_3	0.784
bpn_9	0.761
bpn_14	0.569
bpn_21	0.589
bpn_6	0.776
bpn_11	0.641
bpn_17	0.733
bpn_23	0.653
aut_s	0.376
aut_f	0.566
rel_s	0.534
rel_f	0.777
com_s	0.540
com_f	0.583

Modification index

	lhs	op	rhs	mi	epc	sepc.lv	sepc.all	sepc.nox
77	aut_s	=~	bpn_14	18.811	0.228	0.289	0.240	0.240
191	sat	=~	bpn_14	13.334	0.409	0.409	0.340	0.340
460	rel_s	~~	com_s	11.955	-0.632	-0.632	-0.632	-0.632
452	aut_s	~~	sat	11.955	0.422	0.422	0.422	0.422
453	aut_s	~~	frs	11.955	0.262	0.262	0.262	0.262
158	com_f	=~	bpn_7	11.588	-0.184	-0.285	-0.195	-0.195
83	aut_f	=~	bpn_1	11.112	0.241	0.366	0.243	0.243
140	com_s	=~	bpn_7	9.955	0.202	0.298	0.204	0.204
128	rel_f	=~	bpn_12	9.672	-0.098	-0.208	-0.142	-0.142
76	aut_s	=~	bpn_9	9.661	-0.139	-0.176	-0.145	-0.145
197	frs	=~	bpn_1	9.218	0.293	0.293	0.195	0.195
424	bpn_3	~~	bpn_11	9.041	-0.107	-0.107	-0.232	-0.232
419	bpn_20	~~	bpn_23	8.775	0.173	0.173	0.187	0.187
258	bpn_7	~~	bpn_17	8.455	-0.205	-0.205	-0.209	-0.209
205	frs	=~	bpn_12	8.307	-0.178	-0.178	-0.122	-0.122
114	rel_s	=~	bpn_14	7.925	0.124	0.181	0.151	0.151
464	rel_f	~~	com_s	7.601	-0.397	-0.397	-0.397	-0.397
304	bpn_5	~~	bpn_20	7.429	-0.201	-0.201	-0.170	-0.170
110	rel_s	=~	bpn_8	7.296	-0.143	-0.209	-0.149	-0.149
198	frs	=~	bpn_7	7.250	-0.261	-0.261	-0.179	-0.179

Multi-component in-group identification scale

lavaan 0.6.17 ended normally after 70 iterations

Estimator	ML
Optimization method	NLMINB
Number of model parameters	25
Number of observations	281

Model Test User Model:

	Standard	Scaled
Test Statistic	77.215	58.082
Degrees of freedom	30	30
P-value (Chi-square)	0.000	0.002
Scaling correction factor		1.329
Satorra-Bentler correction		

Model Test Baseline Model:

Test statistic	3219.158	1968.037
Degrees of freedom	45	45
P-value	0.000	0.000
Scaling correction factor		1.636

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.985	0.985
Tucker-Lewis Index (TLI)	0.978	0.978
Robust Comparative Fit Index (CFI)		0.988
Robust Tucker-Lewis Index (TLI)		0.982

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-3536.895	-3536.895
Loglikelihood unrestricted model (H1)	-3498.288	-3498.288
Akaike (AIC)	7123.791	7123.791
Bayesian (BIC)	7214.750	7214.750
Sample-size adjusted Bayesian (SABIC)	7135.476	7135.476

Root Mean Square Error of Approximation:

RMSEA	0.075	0.058
90 Percent confidence interval - lower	0.054	0.038
90 Percent confidence interval - upper	0.096	0.077
P-value H_0: RMSEA <= 0.050	0.024	0.240
P-value H_0: RMSEA >= 0.080	0.360	0.027
Robust RMSEA		0.067
90 Percent confidence interval - lower		0.040
90 Percent confidence interval - upper		0.092
P-value H_0: Robust RMSEA <= 0.050		0.137
P-value H_0: Robust RMSEA >= 0.080		0.205

Standardized Root Mean Square Residual:

SRMR	0.019	0.019

Parameter Estimates:

Standard errors	Robust.sem
Information	Expected
Information saturated (h1) model	Structured

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
sol =~						
sid_1	0.301	0.072	4.195	0.000	1.441	0.943
sid_2	0.296	0.070	4.238	0.000	1.419	0.941
sid_3	0.281	0.067	4.172	0.000	1.344	0.913
sat =~						
sid_4	0.334	0.091	3.676	0.000	1.443	0.956
sid_5	0.249	0.067	3.701	0.000	1.077	0.821
sid_6	0.304	0.081	3.753	0.000	1.313	0.908
sid_7	0.317	0.086	3.688	0.000	1.372	0.931
cen =~						
sid_8	0.364	0.106	3.442	0.001	1.121	0.731
sid_9	0.393	0.113	3.464	0.001	1.208	0.737
sid_10	0.377	0.111	3.405	0.001	1.160	0.773
inv =~						
sol	4.683	1.171	3.998	0.000	0.978	0.978
sat	4.206	1.202	3.498	0.000	0.973	0.973
cen	2.909	0.862	3.373	0.001	0.946	0.946

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.sid_8 ~~						
.sid_9	0.540	0.124	4.363	0.000	0.540	0.466
.sid_4 ~~						
.sid_7	-0.081	0.032	-2.562	0.010	-0.081	-0.341

Variances:

```
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
   .sid_1             0.258    0.050    5.128    0.000    0.258    0.110
   .sid_2             0.259    0.063    4.103    0.000    0.259    0.114
   .sid_3             0.363    0.049    7.414    0.000    0.363    0.167
   .sid_4             0.195    0.042    4.591    0.000    0.195    0.086
   .sid_5             0.559    0.069    8.052    0.000    0.559    0.325
   .sid_6             0.366    0.055    6.695    0.000    0.366    0.175
   .sid_7             0.290    0.049    5.905    0.000    0.290    0.133
   .sid_8             1.098    0.138    7.952    0.000    1.098    0.466
   .sid_9             1.223    0.148    8.292    0.000    1.223    0.456
   .sid_10            0.905    0.123    7.369    0.000    0.905    0.402
   .sol               1.000                              0.044    0.044
   .sat               1.000                              0.054    0.054
   .cen               1.000                              0.106    0.106
    inv               1.000                              1.000    1.000

R-Square:
                   Estimate
    sid_1             0.890
    sid_2             0.886
    sid_3             0.833
    sid_4             0.914
    sid_5             0.675
    sid_6             0.825
    sid_7             0.867
    sid_8             0.534
    sid_9             0.544
    sid_10            0.598
    sol               0.956
    sat               0.946
    cen               0.894
```

Modification index

```
      lhs op    rhs     mi    epc sepc.lv sepc.all sepc.nox
45    cen =~  sid_3 16.903  0.285   0.876    0.595    0.595
60  sid_1 ~~  sid_2 15.102  0.117   0.117    0.455    0.455
52    inv =~  sid_3 15.102  1.732   1.732    1.176    1.176
77  sid_3 ~~  sid_4 10.387  0.076   0.076    0.286    0.286
55    inv =~  sid_6 10.352 -1.399  -1.399   -0.967   -0.967
96  sid_6 ~~  sid_9  9.380 -0.118  -0.118   -0.177   -0.177
44    cen =~  sid_2  8.433 -0.197  -0.605   -0.401   -0.401
39    sat =~  sid_3  8.211  0.135   0.585    0.397    0.397
48    cen =~  sid_6  8.114 -0.193  -0.593   -0.410   -0.410
58    inv =~  sid_9  7.556 -1.556  -1.556   -0.950   -0.950
57    inv =~  sid_8  7.556  1.445   1.445    0.942    0.942
101 sid_8 ~~ sid_10  7.556 -0.187  -0.187   -0.188   -0.188
102 sid_9 ~~ sid_10  7.556  0.202   0.202    0.192    0.192
51    inv =~  sid_2  7.356 -1.276  -1.276   -0.846   -0.846
61  sid_1 ~~  sid_3  7.356 -0.078  -0.078   -0.254   -0.254
75  sid_2 ~~  sid_9  7.098 -0.096  -0.096   -0.170   -0.170
32    sol =~  sid_6  6.755 -0.131  -0.629   -0.435   -0.435
82  sid_3 ~~  sid_9  6.120  0.098   0.098    0.148    0.148
79  sid_3 ~~  sid_6  5.768 -0.062  -0.062   -0.170   -0.170
49    cen =~  sid_7  5.582  0.165   0.509    0.345    0.345
```

Perceived stress scale

```
lavaan 0.6.17 ended normally after 19 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        21

  Number of observations                           281

Model Test User Model:
                                              Standard      Scaled
  Test Statistic                                40.966      32.065
  Degrees of freedom                                34          34
  P-value (Chi-square)                           0.191       0.563
  Scaling correction factor                                  1.278
    Satorra-Bentler correction
```

Model Test Baseline Model:

Test statistic	1720.686	1874.173
Degrees of freedom	45	45
P-value	0.000	0.000
Scaling correction factor		0.918

User Model versus Baseline Model:

Comparative Fit Index (CFI)	0.996	1.000
Tucker-Lewis Index (TLI)	0.994	1.001
Robust Comparative Fit Index (CFI)		1.000
Robust Tucker-Lewis Index (TLI)		1.002

Loglikelihood and Information Criteria:

Loglikelihood user model (H0)	-3293.833	-3293.833
Loglikelihood unrestricted model (H1)	-3273.350	-3273.350
Akaike (AIC)	6629.665	6629.665
Bayesian (BIC)	6706.071	6706.071
Sample-size adjusted Bayesian (SABIC)	6639.480	6639.480

Root Mean Square Error of Approximation:

RMSEA	0.027	0.000
90 Percent confidence interval - lower	0.000	0.000
90 Percent confidence interval - upper	0.053	0.037
P-value H_0: RMSEA <= 0.050	0.918	0.996
P-value H_0: RMSEA >= 0.080	0.000	0.000
Robust RMSEA		0.000
90 Percent confidence interval - lower		0.000
90 Percent confidence interval - upper		0.045
P-value H_0: Robust RMSEA <= 0.050		0.973
P-value H_0: Robust RMSEA >= 0.080		0.000

Standardized Root Mean Square Residual:

SRMR	0.022

Parameter Estimates:

Standard errors	Robust.sem
Information	Expected
Information saturated (h1) model	Structured

Latent Variables:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
help =~						
pss_1	0.822	0.045	18.075	0.000	0.822	0.774
pss_2	0.860	0.046	18.608	0.000	0.860	0.781
pss_3	0.789	0.046	17.063	0.000	0.789	0.751
pss_6	0.829	0.047	17.677	0.000	0.829	0.756
pss_9	0.842	0.047	17.943	0.000	0.842	0.772
pss_10	0.753	0.043	17.674	0.000	0.753	0.759
seff =~						
pss_4	0.804	0.046	17.347	0.000	0.804	0.764
pss_5	0.751	0.045	16.824	0.000	0.751	0.765
pss_7	0.790	0.043	18.299	0.000	0.790	0.753
pss_8	0.834	0.045	18.466	0.000	0.834	0.783

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
help ~~						
seff	-0.977	0.017	-58.197	0.000	-0.977	-0.977

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.pss_1	0.451	0.042	10.746	0.000	0.451	0.401
.pss_2	0.474	0.040	12.001	0.000	0.474	0.391
.pss_3	0.480	0.043	11.082	0.000	0.480	0.436
.pss_6	0.517	0.049	10.603	0.000	0.517	0.429
.pss_9	0.479	0.050	9.617	0.000	0.479	0.403
.pss_10	0.418	0.042	9.885	0.000	0.418	0.424

```
   .pss_4             0.462    0.044   10.461    0.000    0.462    0.417
   .pss_5             0.400    0.034   11.690    0.000    0.400    0.415
   .pss_7             0.478    0.043   11.004    0.000    0.478    0.434
   .pss_8             0.439    0.045    9.740    0.000    0.439    0.387
    help              1.000                              1.000    1.000
    seff              1.000                              1.000    1.000

R-Square:
                  Estimate
    pss_1            0.599
    pss_2            0.609
    pss_3            0.564
    pss_6            0.571
    pss_9            0.597
    pss_10           0.576
    pss_4            0.583
    pss_5            0.585
    pss_7            0.566
    pss_8            0.613
```

Modification index

	lhs	op	rhs	mi	epc	sepc.lv	sepc.all	sepc.nox
39	pss_1	~~	pss_4	6.348	-0.080	-0.080	-0.174	-0.174
26	help	=~	pss_7	5.495	1.658	1.658	1.580	1.580
51	pss_3	~~	pss_6	4.991	0.076	0.076	0.152	0.152
31	seff	=~	pss_6	4.670	1.361	1.361	1.240	1.240
74	pss_4	~~	pss_7	3.886	0.066	0.066	0.141	0.141
47	pss_2	~~	pss_4	3.600	-0.062	-0.062	-0.132	-0.132
60	pss_6	~~	pss_4	3.256	0.060	0.060	0.124	0.124
75	pss_4	~~	pss_8	2.833	-0.056	-0.056	-0.125	-0.125
62	pss_6	~~	pss_7	2.663	0.055	0.055	0.111	0.111
69	pss_10	~~	pss_4	2.648	0.049	0.049	0.112	0.112
59	pss_6	~~	pss_10	2.571	0.051	0.051	0.110	0.110
73	pss_4	~~	pss_5	2.208	-0.046	-0.046	-0.108	-0.108
57	pss_3	~~	pss_8	2.139	0.046	0.046	0.101	0.101
30	seff	=~	pss_3	2.022	0.859	0.859	0.818	0.818
38	pss_1	~~	pss_10	1.896	-0.041	-0.041	-0.095	-0.095
49	pss_2	~~	pss_7	1.771	0.044	0.044	0.092	0.092
63	pss_6	~~	pss_8	1.707	-0.043	-0.043	-0.091	-0.091
61	pss_6	~~	pss_5	1.174	0.034	0.034	0.074	0.074
24	help	=~	pss_4	1.132	-0.759	-0.759	-0.721	-0.721
72	pss_10	~~	pss_8	1.054	-0.031	-0.031	-0.071	-0.071

Appendix D.

Structural Regression Model Output for the Initial Model in Study 1

```
lavaan 0.6.17 ended normally after 76 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                       107

  Number of observations                           281

Model Test User Model:
                                              Standard      Scaled
  Test Statistic                              1198.279    1138.618
  Degrees of freedom                           796         796
  P-value (Chi-square)                           0.000       0.000
  Scaling correction factor                                  1.052
    Satorra-Bentler correction

Model Test Baseline Model:

  Test statistic                             10363.838    8935.943
  Degrees of freedom                           861         861
  P-value                                        0.000       0.000
  Scaling correction factor                                  1.160

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    0.958       0.958
  Tucker-Lewis Index (TLI)                       0.954       0.954

  Robust Comparative Fit Index (CFI)                         0.961
  Robust Tucker-Lewis Index (TLI)                            0.958

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)              -15837.728  -15837.728
  Loglikelihood unrestricted model (H1)      -15238.589  -15238.589

  Akaike (AIC)                                31889.456   31889.456
  Bayesian (BIC)                              32278.760   32278.760
  Sample-size adjusted Bayesian (SABIC)       31939.467   31939.467

Root Mean Square Error of Approximation:

  RMSEA                                          0.042       0.039
  90 Percent confidence interval - lower         0.037       0.034
  90 Percent confidence interval - upper         0.047       0.044
  P-value H_0: RMSEA <= 0.050                    0.996       1.000
  P-value H_0: RMSEA >= 0.080                    0.000       0.000

  Robust RMSEA                                               0.040
  90 Percent confidence interval - lower                     0.035
  90 Percent confidence interval - upper                     0.045
  P-value H_0: Robust RMSEA <= 0.050                         0.999
  P-value H_0: Robust RMSEA >= 0.080                         0.000

Standardized Root Mean Square Residual:

  SRMR                                           0.063       0.063

Parameter Estimates:

  Standard errors                            Robust.sem
  Information                                  Expected
  Information saturated (h1) model          Structured

Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  aut_s =~
    bpn_1             1.000                                1.199    0.792
    bpn_7             0.726    0.098    7.438    0.000    0.870    0.595
```

```
    bpn_13            0.814    0.105    7.789    0.000    0.976    0.639
    bpn_19            0.952    0.110    8.629    0.000    1.141    0.677
  com_s =~
    bpn_3             1.000                               1.008    0.889
    bpn_9             1.075    0.044   24.226    0.000    1.084    0.880
    bpn_14            0.917    0.053   17.195    0.000    0.924    0.759
    bpn_21            0.931    0.057   16.415    0.000    0.939    0.776
  rel_s =~
    bpn_4             1.000                               1.147    0.828
    bpn_12            1.142    0.061   18.681    0.000    1.310    0.897
    bpn_16            1.121    0.067   16.776    0.000    1.286    0.855
    bpn_24            1.105    0.061   18.013    0.000    1.268    0.893
  rel_f =~
    bpn_2             1.000                               1.525    0.836
    bpn_8             0.726    0.054   13.495    0.000    1.107    0.785
    bpn_20            0.729    0.062   11.691    0.000    1.112    0.734
  com_f =~
    bpn_6             1.000                               1.406    0.876
    bpn_11            0.840    0.048   17.576    0.000    1.180    0.800
    bpn_17            1.005    0.047   21.591    0.000    1.413    0.859
    bpn_23            0.875    0.045   19.305    0.000    1.229    0.806
  aut_f =~
    bpn_5             1.000                               0.954    0.638
    bpn_10            1.468    0.136   10.791    0.000    1.400    0.811
    bpn_15            1.400    0.131   10.671    0.000    1.335    0.710
  sol =~
    sid_1             1.000                               1.446    0.946
    sid_2             0.979    0.023   42.523    0.000    1.415    0.939
    sid_3             0.929    0.036   25.743    0.000    1.343    0.912
  sat =~
    sid_4             1.000                               1.436    0.952
    sid_5             0.752    0.043   17.515    0.000    1.080    0.823
    sid_6             0.918    0.033   27.890    0.000    1.318    0.912
    sid_7             0.954    0.030   31.571    0.000    1.370    0.930
  cen =~
    sid_8             1.000                               1.114    0.726
    sid_9             1.080    0.071   15.166    0.000    1.203    0.734
    sid_10            1.047    0.086   12.237    0.000    1.167    0.778
  hel =~
    pss_1             1.000                               0.816    0.769
    pss_3             0.973    0.073   13.260    0.000    0.794    0.757
    pss_6             1.014    0.068   14.932    0.000    0.827    0.754
    pss_2             1.051    0.068   15.442    0.000    0.858    0.779
    pss_9             1.033    0.071   14.622    0.000    0.843    0.773
    pss_10            0.926    0.069   13.403    0.000    0.755    0.761
  sef =~
    pss_4             1.000                               0.802    0.762
    pss_5             0.935    0.063   14.745    0.000    0.750    0.764
    pss_7             0.986    0.061   16.103    0.000    0.791    0.754
    pss_8             1.041    0.067   15.523    0.000    0.835    0.784
  bpn_s =~
    aut_s             1.000                               0.567    0.567
    com_s             0.843    0.135    6.235    0.000    0.569    0.569
    rel_s             1.604    0.212    7.549    0.000    0.951    0.951
  bpn_f =~
    aut_f             1.000                               0.764    0.764
    com_f             1.328    0.178    7.458    0.000    0.689    0.689
    rel_f             1.954    0.237    8.237    0.000    0.934    0.934
  inv =~
    sol               1.000                               0.986    0.986
    sat               0.974    0.036   26.714    0.000    0.967    0.967
    cen               0.737    0.055   13.505    0.000    0.943    0.943

Regressions:
                  Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  hel ~
    bpn_f             0.670    0.128    5.245    0.000    0.598    0.598
    bpn_s             0.070    0.107    0.657    0.511    0.058    0.058
  sef ~
```

```
    bpn_f             -0.596    0.116   -5.125    0.000   -0.541   -0.541
    bpn_s             -0.023    0.101   -0.228    0.820   -0.019   -0.019
  bpn_f ~
    inv               -0.328    0.044   -7.410    0.000   -0.641   -0.641
  bpn_s ~
    inv                0.470    0.060    7.872    0.000    0.984    0.984

Covariances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
 .sid_8 ~~
   .sid_9             0.554    0.123    4.505    0.000    0.554    0.472
 .sid_4 ~~
   .sid_7            -0.069    0.031   -2.186    0.029   -0.069   -0.273
 .aut_s ~~
   .aut_f            -0.285    0.086   -3.317    0.001   -0.470   -0.470
 .com_s ~~
   .com_f            -0.691    0.095   -7.240    0.000   -0.818   -0.818
 .rel_s ~~
   .rel_f            -0.059    0.042   -1.389    0.165   -0.304   -0.304
 .bpn_13 ~~
   .bpn_19            0.601    0.152    3.948    0.000    0.601    0.412
 .bpn_8 ~~
   .bpn_20            0.311    0.102    3.052    0.002    0.311    0.346
 .hel ~~
   .sef              -0.445    0.051   -8.685    0.000   -0.968   -0.968

Variances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
    .bpn_1            0.852    0.190    4.474    0.000    0.852    0.372
    .bpn_7            1.385    0.162    8.551    0.000    1.385    0.646
    .bpn_13           1.380    0.173    7.967    0.000    1.380    0.592
    .bpn_19           1.540    0.208    7.422    0.000    1.540    0.542
    .bpn_3            0.270    0.039    6.998    0.000    0.270    0.210
    .bpn_9            0.344    0.055    6.300    0.000    0.344    0.226
    .bpn_14           0.628    0.108    5.794    0.000    0.628    0.424
    .bpn_21           0.582    0.080    7.301    0.000    0.582    0.398
    .bpn_4            0.605    0.108    5.580    0.000    0.605    0.315
    .bpn_12           0.416    0.053    7.926    0.000    0.416    0.195
    .bpn_16           0.611    0.074    8.243    0.000    0.611    0.270
    .bpn_24           0.408    0.047    8.591    0.000    0.408    0.202
    .bpn_2            0.999    0.168    5.936    0.000    0.999    0.301
    .bpn_8            0.764    0.115    6.638    0.000    0.764    0.384
    .bpn_20           1.057    0.174    6.081    0.000    1.057    0.461
    .bpn_6            0.597    0.095    6.283    0.000    0.597    0.232
    .bpn_11           0.783    0.104    7.564    0.000    0.783    0.360
    .bpn_17           0.708    0.116    6.119    0.000    0.708    0.262
    .bpn_23           0.815    0.091    8.980    0.000    0.815    0.350
    .bpn_5            1.323    0.136    9.736    0.000    1.323    0.592
    .bpn_10           1.019    0.137    7.444    0.000    1.019    0.342
    .bpn_15           1.749    0.204    8.584    0.000    1.749    0.495
    .sid_1            0.244    0.045    5.414    0.000    0.244    0.105
    .sid_2            0.271    0.064    4.204    0.000    0.271    0.119
    .sid_3            0.366    0.048    7.697    0.000    0.366    0.168
    .sid_4            0.214    0.043    4.959    0.000    0.214    0.094
    .sid_5            0.554    0.069    7.975    0.000    0.554    0.322
    .sid_6            0.353    0.052    6.744    0.000    0.353    0.169
    .sid_7            0.295    0.047    6.225    0.000    0.295    0.136
    .sid_8            1.115    0.137    8.160    0.000    1.115    0.473
    .sid_9            1.235    0.147    8.380    0.000    1.235    0.461
    .sid_10           0.890    0.124    7.166    0.000    0.890    0.395
    .pss_1            0.460    0.042   11.008    0.000    0.460    0.409
    .pss_3            0.470    0.043   10.926    0.000    0.470    0.427
    .pss_6            0.519    0.048   10.847    0.000    0.519    0.431
    .pss_2            0.477    0.039   12.129    0.000    0.477    0.393
    .pss_9            0.478    0.049    9.680    0.000    0.478    0.402
    .pss_10           0.415    0.042    9.996    0.000    0.415    0.421
    .pss_4            0.464    0.044   10.462    0.000    0.464    0.419
    .pss_5            0.402    0.034   11.727    0.000    0.402    0.417
    .pss_7            0.476    0.043   11.004    0.000    0.476    0.432
```

.pss_8	0.436	0.045	9.764	0.000	0.436	0.385
.aut_s	0.974	0.198	4.922	0.000	0.678	0.678
.com_s	0.687	0.086	8.029	0.000	0.676	0.676
.rel_s	0.127	0.066	1.929	0.054	0.096	0.096
.rel_f	0.297	0.162	1.827	0.068	0.128	0.128
.com_f	1.038	0.161	6.440	0.000	0.525	0.525
.aut_f	0.378	0.094	4.047	0.000	0.416	0.416
.sol	0.058	0.027	2.134	0.033	0.028	0.028
.sat	0.135	0.052	2.600	0.009	0.065	0.065
.cen	0.136	0.076	1.791	0.073	0.110	0.110
.hel	0.455	0.059	7.727	0.000	0.683	0.683
.sef	0.464	0.067	6.972	0.000	0.720	0.720
.bpn_s	0.014	0.018	0.775	0.438	0.031	0.031
.bpn_f	0.313	0.072	4.337	0.000	0.589	0.589
inv	2.032	0.206	9.864	0.000	1.000	1.000

R-Square:

	Estimate
bpn_1	0.628
bpn_7	0.354
bpn_13	0.408
bpn_19	0.458
bpn_3	0.790
bpn_9	0.774
bpn_14	0.576
bpn_21	0.602
bpn_4	0.685
bpn_12	0.805
bpn_16	0.730
bpn_24	0.798
bpn_2	0.699
bpn_8	0.616
bpn_20	0.539
bpn_6	0.768
bpn_11	0.640
bpn_17	0.738
bpn_23	0.650
bpn_5	0.408
bpn_10	0.658
bpn_15	0.505
sid_1	0.895
sid_2	0.881
sid_3	0.832
sid_4	0.906
sid_5	0.678
sid_6	0.831
sid_7	0.864
sid_8	0.527
sid_9	0.539
sid_10	0.605
pss_1	0.591
pss_3	0.573
pss_6	0.569
pss_2	0.607
pss_9	0.598
pss_10	0.579
pss_4	0.581
pss_5	0.583
pss_7	0.568
pss_8	0.615
aut_s	0.322
com_s	0.324
rel_s	0.904
rel_f	0.872
com_f	0.475
aut_f	0.584
sol	0.972
sat	0.935
cen	0.890

hel	0.317
sef	0.280
bpn_s	0.969
bpn_f	0.411

Appendix E.

Study 1 Structural Regression Model Output for the Identified Model

```
lavaan 0.6.17 ended normally after 91 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                       112

  Number of observations                           281

Model Test User Model:
                                              Standard      Scaled
  Test Statistic                              1140.408    1082.299
  Degrees of freedom                           791         791
  P-value (Chi-square)                           0.000       0.000
  Scaling correction factor                                  1.054
    Satorra-Bentler correction

Model Test Baseline Model:

  Test statistic                             10363.838    8935.943
  Degrees of freedom                           861         861
  P-value                                        0.000       0.000
  Scaling correction factor                                  1.160

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    0.963       0.964
  Tucker-Lewis Index (TLI)                       0.960       0.961

  Robust Comparative Fit Index (CFI)                         0.967
  Robust Tucker-Lewis Index (TLI)                            0.964

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)              -15808.792  -15808.792
  Loglikelihood unrestricted model (H1)      -15238.589  -15238.589

  Akaike (AIC)                                31841.585   31841.585
  Bayesian (BIC)                              32249.081   32249.081
  Sample-size adjusted Bayesian (SABIC)       31893.933   31893.933

Root Mean Square Error of Approximation:

  RMSEA                                          0.040       0.036
  90 Percent confidence interval - lower         0.034       0.031
  90 Percent confidence interval - upper         0.045       0.041
  P-value H_0: RMSEA <= 0.050                    1.000       1.000
  P-value H_0: RMSEA >= 0.080                    0.000       0.000

  Robust RMSEA                                               0.037
  90 Percent confidence interval - lower                     0.031
  90 Percent confidence interval - upper                     0.043
  P-value H_0: Robust RMSEA <= 0.050                         1.000
  P-value H_0: Robust RMSEA >= 0.080                         0.000

Standardized Root Mean Square Residual:

  SRMR                                           0.056       0.056

Parameter Estimates:

  Standard errors                            Robust.sem
  Information                                  Expected
  Information saturated (h1) model          Structured

Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  aut_s =~
    bpn_1             1.000                               1.172    0.780
    bpn_7             0.735    0.094    7.843    0.000    0.861    0.591
    bpn_13            0.831    0.108    7.726    0.000    0.974    0.641
    bpn_19            0.972    0.112    8.666    0.000    1.139    0.679
  com_s =~
    bpn_3             1.000                               0.957    0.877
    bpn_9             1.074    0.050   21.433    0.000    1.028    0.866
    bpn_14            0.927    0.059   15.617    0.000    0.886    0.749
    bpn_21            0.939    0.063   14.787    0.000    0.898    0.764
```

```
  rel_s =~
    bpn_4             1.000                                    1.152    0.828
    bpn_12            1.143    0.061   18.857    0.000         1.316    0.898
    bpn_16            1.120    0.066   16.920    0.000         1.290    0.855
    bpn_24            1.107    0.061   18.183    0.000         1.275    0.895
  rel_f =~
    bpn_2             1.000                                    1.467    0.813
    bpn_8             0.762    0.055   13.984    0.000         1.118    0.801
    bpn_20            0.755    0.066   11.515    0.000         1.108    0.738
  com_f =~
    bpn_6             1.000                                    1.391    0.875
    bpn_11            0.838    0.049   17.125    0.000         1.166    0.797
    bpn_17            1.002    0.048   20.993    0.000         1.394    0.855
    bpn_23            0.873    0.046   18.785    0.000         1.214    0.802
  aut_f =~
    bpn_5             1.000                                    0.950    0.642
    bpn_10            1.385    0.133   10.424    0.000         1.315    0.773
    bpn_15            1.420    0.135   10.522    0.000         1.349    0.726
  sol =~
    sid_1             1.000                                    1.446    0.947
    sid_2             0.979    0.023   42.456    0.000         1.416    0.939
    sid_3             0.928    0.036   25.633    0.000         1.342    0.911
  sat =~
    sid_4             1.000                                    1.435    0.951
    sid_5             0.753    0.043   17.522    0.000         1.080    0.824
    sid_6             0.919    0.033   27.939    0.000         1.319    0.912
    sid_7             0.955    0.030   31.569    0.000         1.370    0.930
  cen =~
    sid_8             1.000                                    1.114    0.726
    sid_9             1.080    0.071   15.157    0.000         1.203    0.735
    sid_10            1.047    0.086   12.240    0.000         1.167    0.778
  hel =~
    pss_1             1.000                                    0.816    0.769
    pss_3             0.972    0.073   13.321    0.000         0.793    0.756
    pss_6             1.015    0.067   15.073    0.000         0.828    0.755
    pss_2             1.050    0.068   15.493    0.000         0.857    0.778
    pss_9             1.035    0.070   14.705    0.000         0.844    0.775
    pss_10            0.922    0.069   13.436    0.000         0.752    0.758
  sef =~
    pss_4             1.000                                    0.801    0.762
    pss_5             0.935    0.064   14.711    0.000         0.750    0.764
    pss_7             0.986    0.061   16.093    0.000         0.790    0.753
    pss_8             1.042    0.067   15.482    0.000         0.835    0.784
  bpn_s =~
    aut_s             1.000                                    0.735    0.735
    com_s             0.688    0.120    5.718    0.000         0.619    0.619
    rel_s             0.030    0.103    0.292    0.771         0.022    0.022
  bpn_f =~
    aut_f             1.000                                    0.899    0.899
    com_f             0.925    0.149    6.222    0.000         0.567    0.567
    rel_f             0.903    0.161    5.597    0.000         0.526    0.526
  inv =~
    sol               1.000                                    0.984    0.984
    sat               0.977    0.036   26.807    0.000         0.969    0.969
    cen               0.739    0.055   13.518    0.000         0.944    0.944

Regressions:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  hel ~
    bpn_f             0.615    0.102    6.024    0.000    0.644    0.644
    bpn_s            -0.049    0.064   -0.765    0.444   -0.052   -0.052
  sef ~
    bpn_f            -0.569    0.093   -6.123    0.000   -0.606   -0.606
    bpn_s             0.041    0.064    0.631    0.528    0.044    0.044
  bpn_f ~
    inv              -0.307    0.051   -6.050    0.000   -0.513   -0.513
  bpn_s ~
    inv               0.455    0.061    7.452    0.000    0.752    0.752

Covariances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
 .sid_8 ~~
   .sid_9             0.553    0.123    4.514    0.000    0.553    0.472
 .sid_4 ~~
   .sid_7            -0.067    0.031   -2.141    0.032   -0.067   -0.264
 .aut_s ~~
```

```
    .aut_f            -0.152    0.080   -1.903    0.057   -0.460   -0.460
  .com_s ~~
    .com_f            -0.746    0.090   -8.322    0.000   -0.866   -0.866
  .rel_s ~~
    .rel_f            -0.630    0.129   -4.870    0.000   -0.527   -0.527
  .rel_f ~~
     inv              -0.799    0.155   -5.161    0.000   -0.532   -0.532
  .rel_s ~~
     inv               1.509    0.184    8.204    0.000    0.936    0.936
  .bpn_13 ~~
    .bpn_19            0.579    0.147    3.929    0.000    0.579    0.403
  .bpn_8 ~~
    .bpn_20            0.261    0.098    2.662    0.008    0.261    0.309
  .aut_s ~~
    .rel_f             0.285    0.078    3.633    0.000    0.340    0.340
  .rel_f ~~
    .com_f             0.523    0.120    4.355    0.000    0.433    0.433
  .com_s ~~
    .rel_f            -0.150    0.070   -2.123    0.034   -0.189   -0.189
  .hel ~~
    .sef              -0.367    0.050   -7.351    0.000   -0.962   -0.962

Variances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
    .bpn_1             0.883    0.185    4.781    0.000    0.883    0.392
    .bpn_7             1.384    0.149    9.292    0.000    1.384    0.651
    .bpn_13            1.361    0.172    7.925    0.000    1.361    0.589
    .bpn_19            1.515    0.206    7.370    0.000    1.515    0.539
    .bpn_3             0.276    0.038    7.174    0.000    0.276    0.232
    .bpn_9             0.353    0.055    6.405    0.000    0.353    0.250
    .bpn_14            0.616    0.106    5.786    0.000    0.616    0.440
    .bpn_21            0.574    0.078    7.390    0.000    0.574    0.416
    .bpn_4             0.607    0.109    5.596    0.000    0.607    0.314
    .bpn_12            0.416    0.052    7.933    0.000    0.416    0.194
    .bpn_16            0.615    0.075    8.255    0.000    0.615    0.270
    .bpn_24            0.404    0.047    8.609    0.000    0.404    0.199
    .bpn_2             1.102    0.179    6.153    0.000    1.102    0.339
    .bpn_8             0.697    0.107    6.511    0.000    0.697    0.358
    .bpn_20            1.026    0.177    5.781    0.000    1.026    0.455
    .bpn_6             0.590    0.094    6.262    0.000    0.590    0.234
    .bpn_11            0.782    0.103    7.566    0.000    0.782    0.365
    .bpn_17            0.715    0.115    6.207    0.000    0.715    0.269
    .bpn_23            0.817    0.090    9.059    0.000    0.817    0.357
    .bpn_5             1.290    0.134    9.619    0.000    1.290    0.588
    .bpn_10            1.163    0.136    8.544    0.000    1.163    0.402
    .bpn_15            1.632    0.194    8.420    0.000    1.632    0.473
    .sid_1             0.242    0.045    5.379    0.000    0.242    0.104
    .sid_2             0.269    0.065    4.158    0.000    0.269    0.118
    .sid_3             0.369    0.048    7.661    0.000    0.369    0.170
    .sid_4             0.218    0.043    5.069    0.000    0.218    0.096
    .sid_5             0.553    0.069    7.966    0.000    0.553    0.322
    .sid_6             0.351    0.052    6.748    0.000    0.351    0.168
    .sid_7             0.295    0.047    6.280    0.000    0.295    0.136
    .sid_8             1.115    0.136    8.176    0.000    1.115    0.473
    .sid_9             1.234    0.147    8.394    0.000    1.234    0.460
    .sid_10            0.890    0.124    7.153    0.000    0.890    0.395
    .pss_1             0.460    0.042   11.025    0.000    0.460    0.409
    .pss_3             0.471    0.043   10.998    0.000    0.471    0.428
    .pss_6             0.517    0.048   10.816    0.000    0.517    0.430
    .pss_2             0.478    0.039   12.113    0.000    0.478    0.395
    .pss_9             0.475    0.049    9.653    0.000    0.475    0.400
    .pss_10            0.418    0.041   10.115    0.000    0.418    0.425
    .pss_4             0.465    0.044   10.472    0.000    0.465    0.420
    .pss_5             0.401    0.034   11.702    0.000    0.401    0.417
    .pss_7             0.476    0.043   11.061    0.000    0.476    0.432
    .pss_8             0.436    0.045    9.771    0.000    0.436    0.385
    .aut_s             0.632    0.185    3.417    0.001    0.460    0.460
    .com_s             0.565    0.086    6.575    0.000    0.617    0.617
    .rel_s             1.284    0.215    5.988    0.000    0.968    0.968
    .rel_f             1.113    0.198    5.610    0.000    0.518    0.518
    .com_f             1.313    0.162    8.118    0.000    0.678    0.678
    .aut_f             0.174    0.094    1.844    0.065    0.192    0.192
    .sol               0.066    0.027    2.500    0.012    0.032    0.032
    .sat               0.127    0.050    2.533    0.011    0.062    0.062
    .cen               0.136    0.076    1.781    0.075    0.109    0.109
    .hel               0.371    0.055    6.686    0.000    0.557    0.557
```

.sef	0.392	0.064	6.092	0.000	0.611	0.611
.bpn_s	0.321	0.093	3.446	0.001	0.434	0.434
.bpn_f	0.537	0.120	4.491	0.000	0.737	0.737
inv	2.026	0.206	9.856	0.000	1.000	1.000

R-Square:

	Estimate
bpn_1	0.608
bpn_7	0.349
bpn_13	0.411
bpn_19	0.461
bpn_3	0.768
bpn_9	0.750
bpn_14	0.560
bpn_21	0.584
bpn_4	0.686
bpn_12	0.806
bpn_16	0.730
bpn_24	0.801
bpn_2	0.661
bpn_8	0.642
bpn_20	0.545
bpn_6	0.766
bpn_11	0.635
bpn_17	0.731
bpn_23	0.643
bpn_5	0.412
bpn_10	0.598
bpn_15	0.527
sid_1	0.896
sid_2	0.882
sid_3	0.830
sid_4	0.904
sid_5	0.678
sid_6	0.832
sid_7	0.864
sid_8	0.527
sid_9	0.540
sid_10	0.605
pss_1	0.591
pss_3	0.572
pss_6	0.570
pss_2	0.605
pss_9	0.600
pss_10	0.575
pss_4	0.580
pss_5	0.583
pss_7	0.568
pss_8	0.615
aut_s	0.540
com_s	0.383
rel_s	0.032
rel_f	0.482
com_f	0.322
aut_f	0.808
sol	0.968
sat	0.938
cen	0.891
hel	0.443
sef	0.389
bpn_s	0.566
bpn_f	0.263

Modification index

	lhs	op	rhs	mi	epc	sepc.lv	sepc.all	sepc.nox
134	aut_s	=~	bpn_14	20.053	0.256	0.305	0.256	0.256
150	aut_s	=~	sid_1	17.317	-0.171	-0.204	-0.134	-0.134
226	rel_s	=~	sid_1	15.095	0.471	0.544	0.356	0.356
133	aut_s	=~	bpn_9	13.658	-0.182	-0.217	-0.181	-0.181
190	com_s	=~	sid_3	13.487	0.181	0.175	0.119	0.119
1382	sid_3	~~	sid_4	13.280	0.085	0.085	0.302	0.302
368	sol	=~	bpn_14	13.249	0.149	0.215	0.181	0.181
642	inv	=~	bpn_14	12.768	0.149	0.213	0.178	0.178
499	hel	=~	bpn_15	12.733	0.602	0.491	0.264	0.264
558	bpn_s	=~	bpn_14	12.613	0.317	0.289	0.243	0.243

445	cen	=~	bpn_14	12.315	0.188	0.212	0.178	0.178
535	sef	=~	bpn_15	12.290	-0.574	-0.460	-0.247	-0.247
1083	bpn_24	~~	sid_3	12.264	-0.099	-0.099	-0.255	-0.255
660	inv	=~	sid_3	11.581	1.425	2.031	1.379	1.379
1345	sid_1	~~	sid_2	11.580	0.096	0.096	0.375	0.375
407	sat	=~	bpn_14	11.234	0.137	0.196	0.165	0.165
229	rel_s	=~	sid_4	10.751	-0.359	-0.415	-0.275	-0.275
1087	bpn_24	~~	sid_7	10.747	0.088	0.088	0.258	0.258
152	aut_s	=~	sid_3	10.300	0.150	0.179	0.122	0.122
286	com_f	=~	bpn_7	10.175	-0.190	-0.265	-0.181	-0.181

Appendix F.

Analysis of Variance in Subscales for Latent Profiles in Study 1

Self-efficacy

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   2107   421.4   93.81 <2e-16 ***
Residuals   275   1235     4.5
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = sef ~ Class, data = as.data.frame(df))

$Class
          diff        lwr         upr     p adj
2-1 -1.7478933 -3.3996226 -0.09616389 0.0310790
3-1 -5.1537477 -6.0940020 -4.21349339 0.0000000
4-1 -7.5274985 -8.7062284 -6.34876863 0.0000000
5-1 -5.3696038 -6.5483337 -4.19087390 0.0000000
6-1 -3.9711075 -5.4467833 -2.49543184 0.0000000
3-2 -3.4058544 -5.0734376 -1.73827126 0.0000002
4-2 -5.7796053 -7.5923820 -3.96682849 0.0000000
5-2 -3.6217105 -5.4344873 -1.80893376 0.0000004
6-2 -2.2232143 -4.2417222 -0.20470636 0.0214091
4-3 -2.3737508 -3.5745955 -1.17290619 0.0000005
5-3 -0.2158561 -1.4167007  0.98498854 0.9955320
6-3  1.1826401 -0.3107595  2.67603979 0.2088575
5-4  2.1578947  0.7624185  3.55337094 0.0001897
6-4  3.5563910  1.9024356  5.21034639 0.0000000
6-5  1.3984962 -0.2554592  3.05245165 0.1507101
```

Helplessness

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   4989   997.8   107.9 <2e-16 ***
Residuals   275   2543     9.2
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = hel ~ Class, data = as.data.frame(df))

$Class
          diff        lwr        upr     p adj
2-1  1.8412921 -0.5285013  4.2110855 0.2274683
3-1  7.9789504  6.6299349  9.3279658 0.0000000
4-1 11.0189237  9.3277591 12.7100884 0.0000000
5-1  8.8610290  7.1698643 10.5521936 0.0000000
6-1  6.2043874  4.0871843  8.3215905 0.0000000
3-2  6.1376582  3.7451188  8.5301976 0.0000000
4-2  9.1776316  6.5767779 11.7784853 0.0000000
5-2  7.0197368  4.4188832  9.6205905 0.0000000
6-2  4.3630952  1.4670719  7.2591186 0.0003075
4-3  3.0399734  1.3170799  4.7628668 0.0000111
5-3  0.8820786 -0.8408148  2.6049721 0.6841230
6-3 -1.7745630 -3.9171952  0.3680693 0.1680240
5-4 -2.1578947 -4.1600328 -0.1557566 0.0263033
6-4 -4.8145363 -7.1875235 -2.4415492 0.0000002
6-5 -2.6566416 -5.0296288 -0.2836544 0.0182202
```

Solidarity

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   2858   571.5   66.91 <2e-16 ***
Residuals   275   2349     8.5
```

```
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = sol ~ Class, data = as.data.frame(df))

$Class
          diff         lwr        upr     p adj
2-1 -4.8075843  -7.0851794 -2.5299891 0.0000001
3-1  0.2572891  -1.0392420  1.5538203 0.9929054
4-1 -9.1957422 -10.8211110 -7.5703733 0.0000000
5-1 -2.1957422  -3.8211110 -0.5703733 0.0018251
6-1 -1.2659176  -3.3007497  0.7689145 0.4768576
3-2  5.0648734   2.7654172  7.3643296 0.0000000
4-2 -4.3881579  -6.8878238 -1.8884920 0.0000126
5-2  2.6118421   0.1121762  5.1115080 0.0347532
6-2  3.5416667   0.7583149  6.3250185 0.0041806
4-3 -9.4530313 -11.1088946 -7.7971681 0.0000000
5-3 -2.4530313  -4.1088946 -0.7971681 0.0004150
6-3 -1.5232068  -3.5824786  0.5360651 0.2785890
5-4  7.0000000   5.0757563  8.9242437 0.0000000
6-4  7.9298246   5.6491599 10.2104893 0.0000000
6-5  0.9298246  -1.3508401  3.2104893 0.8507453
```

Satisfaction

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   4489   897.7   70.83 <2e-16 ***
Residuals   275   3486    12.7
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = sat ~ Class, data = as.data.frame(df))

$Class
           diff          lwr        upr     p adj
2-1  -6.5147472  -9.28921122 -3.7402832 0.0000000
3-1   0.2028161  -1.37655991  1.7821921 0.9991060
4-1 -11.4127735 -13.39272478 -9.4328222 0.0000000
5-1  -3.9127735  -5.89272478 -1.9328222 0.0000005
6-1  -3.0593900  -5.53813097 -0.5806491 0.0061488
3-2   6.7175633   3.91646912  9.5186575 0.0000000
4-2  -4.8980263  -7.94300695 -1.8530457 0.0000872
5-2   2.6019737  -0.44300695  5.6469543 0.1422902
6-2   3.4553571   0.06480313  6.8459112 0.0429222
4-3 -11.6155896 -13.63268776 -9.5984915 0.0000000
5-3  -4.1155896  -6.13268776 -2.0984915 0.0000002
6-3  -3.2622061  -5.77071854 -0.7536938 0.0031272
5-4   7.5000000   5.15597282  9.8440272 0.0000000
6-4   8.3533835   5.57518028 11.1315866 0.0000000
6-5   0.8533835  -1.92481972  3.6315866 0.9506850
```

Centrality

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   1774   354.7   34.15 <2e-16 ***
Residuals   275   2856    10.4
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = cen ~ Class, data = as.data.frame(df))

$Class
          diff        lwr        upr     p adj
2-1 -3.0646067 -5.5762328 -0.5529807 0.0070677
3-1 -0.1373916 -1.5671458  1.2923627 0.9997831
4-1 -7.4725015 -9.2648827 -5.6801203 0.0000000
5-1 -1.0514488 -2.8438300  0.7409323 0.5438425
6-1 -2.6003210 -4.8442392 -0.3564029 0.0127173
3-2  2.9272152  0.3914818  5.4629485 0.0132539
4-2 -4.4078947 -7.1644100 -1.6513794 0.0000984
5-2  2.0131579 -0.7433574  4.7696732 0.2924182
6-2  0.4642857 -2.6050652  3.5336366 0.9980313
4-3 -7.3351099 -9.1611189 -5.5091010 0.0000000
5-3 -0.9140573 -2.7400663  0.9119517 0.7046174
6-3 -2.4629295 -4.7337987 -0.1920603 0.0248064
5-4  6.4210526  4.2990862  8.5430191 0.0000000
6-4  4.8721805  2.3571695  7.3871914 0.0000010
6-5 -1.5488722 -4.0638831  0.9661388 0.4885741
```

Relatedness frustration

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   4993   998.7   79.95 <2e-16 ***
Residuals   275   3435    12.5
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = rel_f ~ Class, data = as.data.frame(df))

$Class
            diff         lwr        upr     p adj
2-1   5.33005618   2.5756918  8.0844206 0.0000010
3-1   0.65125871  -0.9166755  2.2191929 0.8404445
4-1   9.61295092   7.6473434 11.5785584 0.0000000
5-1   9.66558250   7.6999750 11.6311900 0.0000000
6-1  -0.90208668  -3.3628703  1.5586970 0.8996262
3-2  -4.67879747  -7.4595991 -1.8979959 0.0000335
4-2   4.28289474   1.2599735  7.3058160 0.0008776
5-2   4.33552632   1.3126051  7.3584476 0.0007194
6-2  -6.23214286  -9.5981340 -2.8661517 0.0000033
4-3   8.96169221   6.9592069 10.9641775 0.0000000
5-3   9.01432378   7.0118385 11.0168090 0.0000000
6-3  -1.55334539  -4.0436848  0.9369941 0.4738345
5-4   0.05263158  -2.2744143  2.3796774 0.9999998
6-4 -10.51503759 -13.2731141 -7.7569611 0.0000000
6-5 -10.56766917 -13.3257456 -7.8095927 0.0000000
```

Competence frustration

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   3635   727.1   38.52 <2e-16 ***
Residuals   275   5191    18.9
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = com_f ~ Class, data = as.data.frame(df))

$Class
           diff         lwr       upr     p adj
2-1   2.4627809  -0.9229421  5.848504 0.2968229
3-1   0.6360404  -1.2912975  2.563378 0.9337631
4-1   6.5121230   4.0959567  8.928289 0.0000000
5-1   9.8015967   7.3854304 12.217763 0.0000000
6-1  -0.3199572  -3.3448045  2.704890 0.9996526
3-2  -1.8267405  -5.2449607  1.591480 0.6427738
4-2   4.0493421   0.3335034  7.765181 0.0237147
5-2   7.3388158   3.6229770 11.054655 0.0000005
6-2  -2.7827381  -6.9202856  1.354809 0.3859639
4-3   5.8760826   3.4145854  8.337580 0.0000000
5-3   9.1655563   6.7040590 11.627054 0.0000000
6-3  -0.9559976  -4.0171755  2.105180 0.9471711
5-4   3.2894737   0.4290197  6.149928 0.0138056
6-4  -6.8320802 -10.2223661 -3.441794 0.0000003
6-5 -10.1215539 -13.5118398 -6.731268 0.0000000
```

Autonomy frustration

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   3116   623.3   32.08 <2e-16 ***
Residuals   275   5344    19.4
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = aut_f ~ Class, data = as.data.frame(df))

$Class
          diff        lwr        upr     p adj
2-1  0.7970506 -2.6382987  4.2323998 0.9854818
3-1  1.2076518 -0.7479360  3.1632397 0.4854148
4-1  9.1227085  6.6711272 11.5742898 0.0000000
5-1  6.7016558  4.2500745  9.1532371 0.0000000
6-1  4.4547887  1.3856046  7.5239727 0.0005895
3-2  0.4106013 -3.0577215  3.8789240 0.9993978
4-2  8.3256579  4.5553542 12.0959616 0.0000000
5-2  5.9046053  2.1343016  9.6749089 0.0001487
6-2  3.6577381 -0.5404555  7.8559317 0.1275140
4-3  7.9150566  5.4174800 10.4126333 0.0000000
5-3  5.4940040  2.9964273  7.9915807 0.0000000
6-3  3.2471368  0.1410897  6.3531840 0.0345953
5-4 -2.4210526 -5.3234338  0.4813285 0.1619291
6-4 -4.6679198 -8.1078989 -1.2279407 0.0017089
6-5 -2.2468672 -5.6868462  1.1931119 0.4201004
```

Relatedness satisfaction

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   3676   735.3   50.31 <2e-16 ***
Residuals   275   4019    14.6
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = rel_s ~ Class, data = as.data.frame(df))

$Class
           diff          lwr        upr     p adj
2-1  -6.4873596  -9.46674941 -3.5079697 0.0000000
3-1   0.3686531  -1.32737784  2.0646841 0.9892064
4-1 -10.0070964 -12.13328966 -7.8809031 0.0000000
5-1  -3.2965701  -5.42276335 -1.1703768 0.0001804
6-1  -0.3504548  -3.01227901  2.3113694 0.9989912
3-2   6.8560127   3.84802572  9.8639996 0.0000000
4-2  -3.5197368  -6.78962403 -0.2498496 0.0266189
5-2   3.1907895  -0.07909772  6.4606767 0.0603559
6-2   6.1369048   2.49591965  9.7778899 0.0000322
4-3 -10.3757495 -12.54183336 -8.2096656 0.0000000
5-3  -3.6652232  -5.83130705 -1.4991393 0.0000295
6-3  -0.7191079  -3.41290255  1.9746868 0.9729247
5-4   6.7105263   4.19336598  9.2276866 0.0000000
6-4   9.6566416   6.67323642 12.6400468 0.0000000
6-5   2.9461153  -0.03728990  5.9295205 0.0551458
```

Competence satisfaction

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   1877   375.5    38.3 <2e-16 ***
Residuals   275   2696     9.8
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = com_s ~ Class, data = as.data.frame(df))

$Class
            diff          lwr       upr     p adj
2-1 -8.148174157 -10.58836484 -5.707983 0.0000000
3-1 -0.004977955  -1.39406737  1.384111 1.0000000
4-1 -5.513305736  -7.25470826 -3.771903 0.0000000
5-1 -3.013305736  -4.75470826 -1.271903 0.0000177
6-1  0.634563938  -1.54553299  2.814661 0.9606909
3-2  8.143196203   5.67958383 10.606809 0.0000000
4-2  2.634868421  -0.04324645  5.312983 0.0567297
5-2  5.134868421   2.45675355  7.812983 0.0000013
6-2  8.782738095   5.80068526 11.764791 0.0000000
4-3 -5.508327781  -7.28240164 -3.734254 0.0000000
5-3 -3.008327781  -4.78240164 -1.234254 0.0000281
6-3  0.639541893  -1.56673958  2.845823 0.9613748
5-4  2.500000000   0.43838621  4.561614 0.0076087
6-4  6.147869674   3.70439034  8.591349 0.0000000
6-5  3.647869674   1.20439034  6.091349 0.0003621
```

Autonomy satisfaction

```
             Df Sum Sq Mean Sq F value Pr(>F)
Class         5   3320   663.9   56.49 <2e-16 ***
Residuals   275   3232    11.8
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = aut_s ~ Class, data = as.data.frame(df))

$Class
           diff         lwr        upr     p adj
2-1  -4.7619382  -7.4335588 -2.0903176 0.0000087
3-1   0.9049922  -0.6158397  2.4258241 0.5277960
4-1  -6.2652277  -8.1717864 -4.3586690 0.0000000
5-1  -2.6862803  -4.5928390 -0.7797216 0.0009591
6-1 -10.3542001 -12.7410594 -7.9673408 0.0000000
3-2   5.6669304   2.9696668  8.3641940 0.0000001
4-2  -1.5032895  -4.4353992  1.4288202 0.6828087
5-2   2.0756579  -0.8564518  5.0077676 0.3271261
6-2  -5.5922619  -8.8571353 -2.3273885 0.0000224
4-3  -7.1702199  -9.1125485 -5.2278912 0.0000000
5-3  -3.5912725  -5.5336011 -1.6489438 0.0000034
6-3 -11.2591923 -13.6747195 -8.8436651 0.0000000
5-4   3.5789474   1.3218083  5.8360865 0.0001166
6-4  -4.0889724  -6.7641936 -1.4137513 0.0002361
6-5  -7.6679198 -10.3431409 -4.9926987 0.0000000
```

Appendix G.

Questionnaires Used in Study 2

Basic Psychological Need Satisfaction and Frustration Scale (Satisfaction Only)

The next statements tap into your experiences during the past task. Please indicate for each of the statements to what extent they are true for you.

	Not at all true	Rather not true	Sometimes true / Sometimes not true	Rather true	Totally true
1. I felt a sense of choice and freedom in the things I thought and did.	1	2	3	4	5
2. I felt close and connected to the other participants.	1	2	3	4	5
3. I felt like my decisions reflected what I really want.	1	2	3	4	5
4. I felt confident that I could apply the proposed strategies well.	1	2	3	4	5
5. I felt connected with the other participants in my group.	1	2	3	4	5
6. I felt competent to achieve the proposed goals.	1	2	3	4	5
7. I felt like the way the training was delivered reflected how I wanted it myself.	1	2	3	4	5
8. I felt capable at applying the proposed strategies into practice.	1	2	3	4	5
9. I experienced a good bond to the other participants.	1	2	3	4	5
10. I felt I could successfully complete the tasks.	1	2	3	4	5
11. I felt like what I was told really interested me.	1	2	3	4	5
12. I felt that I belonged to the group of participants.	1	2	3	4	5

Intrinsic Motivation Inventory - Interest/Enjoyment

For each of the following statements, please indicate how true it is for you, using the following scale:

	Not at all true			Somewhat true			Very true
1. I enjoyed doing this activity very much.	1	2	3	4	5	6	7
2. This activity was fun to do.	1	2	3	4	5	6	7
3. I thought this was a boring activity.	1	2	3	4	5	6	7
4. This activity did not hold my attention at all.	1	2	3	4	5	6	7
5. I would describe this activity as very interesting.	1	2	3	4	5	6	7
6. I thought this activity was quite enjoyable.	1	2	3	4	5	6	7
7. While I was doing this activity, I was thinking about how much I enjoyed it.	1	2	3	4	5	6	7

Multi-component in-group identification scale

For each of the following statements, please indicate how true it is for you, using the following scale:

	Strongly disagree						Strongly agree
Solidarity 1. I feel a bond with Team One.	1	2	3	4	5	6	7
2. I feel solidarity with Team One.	1	2	3	4	5	6	7
3. I feel committed to Team One.	1	2	3	4	5	6	7
Satisfaction 4. I am glad to be in Team One	1	2	3	4	5	6	7
5. I think that Team One have a lot to be proud of.	1	2	3	4	5	6	7
6. It is pleasant to be in Team One.	1	2	3	4	5	6	7
7. Being in Team One gives me a good feeling.	1	2	3	4	5	6	7
Centrality 8. I often think about the fact that I am in Team One.	1	2	3	4	5	6	7
9. The fact that I am in Team One is an important part of my identity.	1	2	3	4	5	6	7
10. Being in Team One is an important part of how I see myself.	1	2	3	4	5	6	7

Appendix H.

Two-way Mixed Analysis of Variance and Post-hoc Tests for Reaction Times in Study 2

ANOVA Table (type II tests)

ANOVA

	Effect	DFn	DFd	SSn	SSd	F	p	ges
1	(Intercept)	1	245	175200370.16	3018863.1	14218.628	5.62e-219	0.980
2	exp	4	245	135184.38	3018863.1	2.743	2.90e-02	0.037
3	trial	2	490	17189.43	495901.3	8.492	2.37e-04	0.005
4	exp:trial	8	490	18367.06	495901.3	2.269	2.20e-02	0.005

Mauchly's Test for Sphericity

	Effect	W	p	p<.05	est.chi^2	chi^2.df
1	trial	0.788	2.37e-13	*	36.77	2
2	exp:trial	0.788	2.37e-13	*	36.77	2

Sphericity Corrections

	Effect	GGe	DF[GG]	p[GG]	p[GG]<.05	HFe	DF[HF]	p[HF]
1	trial	0.825	1.65, 404.29	0.000628	*	0.83	1.66, 406.68	0.000611
2	exp:trial	0.825	6.6, 404.29	0.031000	*	0.83	6.64, 406.68	0.031000

Simple main effects of experimental group - one-way ANOVA

Trial	Effect	DFn	DFd	F	p	ges	p.adj	d
1	exp	4	245	1.447	0.219	0.023	0.657	
2	exp	4	245	2.746	0.029	0.043	0.087	
3	exp	4	245	4.346	0.002	0.066	0.006	0.26

Simple main effects of experimental group - pairwise comparisons

Trial	grp1	grp2	p	p.sig	p.adj	p.adj.sig	d
1	CON	HH	0.14800	ns	1.0000	ns	
1	CON	HL	0.62400	ns	1.0000	ns	
1	HH	HL	0.05330	ns	0.5330	ns	
1	CON	LH	0.51100	ns	1.0000	ns	
1	HH	LH	0.42900	ns	1.0000	ns	
1	HL	LH	0.25100	ns	1.0000	ns	
1	CON	LL	0.56600	ns	1.0000	ns	
1	HH	LL	0.04380	*	0.4380	ns	
1	HL	LL	0.93300	ns	1.0000	ns	
1	LH	LL	0.21900	ns	1.0000	ns	
2	CON	HH	0.15700	ns	1.0000	ns	
2	CON	HL	0.18600	ns	1.0000	ns	
2	HH	HL	0.00649	**	0.0649	ns	
2	CON	LH	0.93500	ns	1.0000	ns	
2	HH	LH	0.13500	ns	1.0000	ns	
2	HL	LH	0.21400	ns	1.0000	ns	
2	CON	LL	0.14600	ns	1.0000	ns	
2	HH	LL	0.00434	**	0.0434	*	
2	HL	LL	0.89400	ns	1.0000	ns	
2	LH	LL	0.16900	ns	1.0000	ns	
3	CON	HH	0.63800	ns	1.0000	ns	
3	CON	HL	0.00517	**	0.0517	ns	
3	HH	HL	0.00114	**	0.0114	*	0.48
3	CON	LH	0.05730	ns	0.5730	ns	
3	HH	LH	0.01800	*	0.1800	ns	
3	HL	LH	0.36300	ns	1.0000	ns	
3	CON	LL	0.01780	*	0.1780	ns	
3	HH	LL	0.00464	**	0.0464	*	0.38
3	HL	LL	0.66300	ns	1.0000	ns	
3	LH	LL	0.63500	ns	1.0000	ns	

Simple main effects of trial - one-way ANOVA

exp	Effect	DFn	DFd	F	p	ges	p.adj	d
CON	trial	1.54	75.66	0.848	0.406000	0.003	1.000000	
HH	trial	1.44	70.44	0.797	0.417000	0.002	1.000000	
HL	trial	2.00	98.00	8.230	0.000497	0.017	0.002485	0.58
LH	trial	1.50	73.64	5.992	0.008000	0.023	0.040000	0.56
LL	trial	2.00	98.00	3.028	0.053000	0.005	0.265000	

Simple main effects of trial - pairwise comparisons

Exp	group1	group2	statistic	df	p.adj	p.adj.sig	d
CON	1	2	-0.1263825	49	1.000	ns	
CON	1	3	-0.9860776	49	0.987	ns	
CON	2	3	-1.4809670	49	0.435	ns	
HH	1	2	0.2971887	49	1.000	ns	
HH	1	3	0.9457198	49	1.000	ns	
HH	2	3	1.2172483	49	0.687	ns	
HL	1	2	1.9853749	49	0.158	ns	
HL	1	3	3.8258295	49	0.001	**	0.54
HL	2	3	2.2107781	49	0.095	ns	
LH	1	2	1.2137373	49	0.693	ns	
LH	1	3	2.9714921	49	0.014	*	0.42
LH	2	3	3.1899506	49	0.007	**	0.45
LL	1	2	1.9252393	49	0.180	ns	
LL	1	3	2.0439259	49	0.139	ns	
LL	2	3	0.5895796	49	1.000	ns	

Appendix I.

One-way Analysis of Variance and Post-hoc Tests for Study 2

Autonomy

	.y.	n	statistic	DFn	DFd	p	method
1	aut	250	17.360	4	122.330	2.64E-11	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	1.235	0.116	7.560	97.705	0.000	1.689	0.781
CON : HL	1.020	0.109	6.628	94.626	0.000	1.448	0.592
CON : LH	0.940	0.118	5.623	97.995	0.000	1.405	0.475
CON : LL	0.580	0.116	3.533	97.807	0.006	1.036	0.124
HH : HL	-0.215	0.105	1.443	96.238	0.602	0.199	-0.629
HH : LH	-0.295	0.115	1.813	97.778	0.372	0.157	-0.747
HH : LL	-0.655	0.113	4.103	97.989	0.001	-0.211	-1.099
HL : LH	-0.080	0.108	0.522	94.866	0.985	0.346	-0.506
HL : LL	-0.440	0.106	2.934	95.966	0.033	-0.023	-0.857
LH : LL	-0.360	0.116	2.201	97.865	0.188	0.095	-0.815

Competence

	.y.	n	statistic	DFn	DFd	p	method
1	com	250	14.850	4	122.086	6.50E-10	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	0.370	0.119	2.200	85.479	0.190	0.839	-0.099
CON : HL	0.295	0.123	1.703	89.763	0.438	0.777	-0.187
CON : LH	-0.265	0.123	1.525	90.188	0.549	0.219	-0.749
CON : LL	-0.575	0.124	3.286	91.018	0.012	-0.088	-1.062
HH : HL	-0.075	0.098	0.541	97.208	0.983	0.310	-0.460
HH : LH	-0.635	0.098	4.560	97.037	0.000	-0.248	-1.022
HH : LL	-0.945	0.100	6.716	96.647	0.000	-0.554	-1.336
HL : LH	-0.560	0.103	3.853	97.991	0.002	-0.156	-0.964
HL : LL	-0.870	0.104	5.929	97.921	0.000	-0.462	-1.278
LH : LL	-0.310	0.104	2.103	97.965	0.227	0.100	-0.720

Relatedness

	.y.	n	statistic	DFn	DFd	p	method
1	rel	250	23.190	4	118.904	3.50E-14	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	0.855	0.089	6.763	79.964	0.000	1.208	0.502
CON : HL	0.145	0.084	1.218	84.012	0.741	0.477	-0.187
CON : LH	0.580	0.086	4.775	82.643	0.000	0.919	0.241
CON : LL	-0.125	0.057	1.545	90.750	0.536	0.100	-0.350
HH : HL	-0.710	0.104	4.812	97.330	0.000	-0.300	-1.120
HH : LH	-0.275	0.106	1.840	97.703	0.357	0.140	-0.690
HH : LL	-0.980	0.084	8.243	67.768	0.000	-0.647	-1.313
HL : LH	0.435	0.101	3.035	97.924	0.025	0.833	0.037
HL : LL	-0.270	0.079	2.432	70.835	0.119	0.041	-0.581
LH : LL	-0.705	0.080	6.207	69.763	0.000	-0.387	-1.023

Centrality

	.y.	n	statistic	DFn	DFd	p	method
1	cen	250	16.740	4	112.28	8.64E-11	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	0.820	0.178	3.262	89.878	0.013	1.520	0.120
CON : HL	-0.167	0.148	0.797	97.991	0.931	0.415	-0.748
CON : LH	0.720	0.202	2.519	80.947	0.096	1.518	-0.078
CON : LL	-0.533	0.113	3.330	64.385	0.012	-0.084	-0.983
HH : HL	-0.987	0.177	3.938	89.431	0.001	-0.289	-1.684
HH : LH	-0.100	0.224	0.315	94.800	0.998	0.782	-0.982
HH : LL	-1.353	0.149	6.404	57.424	0.000	-0.758	-1.948
HL : LH	0.887	0.202	3.110	80.471	0.021	1.682	0.091
HL : LL	-0.367	0.112	2.309	64.675	0.155	0.079	-0.812
LH : LL	-1.253	0.178	4.987	54.832	0.000	-0.544	-1.962

Satisfaction

	.y.	n	statistic	DFn	DFd	p	method
1	sat	250	20.780	4	122.183	4.38E-13	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	0.665	0.180	2.618	97.946	0.075	1.371	-0.041
CON : HL	-0.640	0.191	2.375	97.201	0.131	0.109	-1.389
CON : LH	-0.005	0.206	0.017	93.312	1.000	0.807	-0.817
CON : LL	-1.450	0.174	5.885	97.248	0.000	-0.765	-2.135
HH : HL	-1.305	0.189	4.894	96.747	0.000	-0.564	-2.046
HH : LH	-0.670	0.204	2.317	92.398	0.149	0.135	-1.475
HH : LL	-2.115	0.172	8.693	97.592	0.000	-1.439	-2.791
HL : LH	0.635	0.214	2.097	96.214	0.230	1.477	-0.207
HL : LL	-0.810	0.183	3.123	95.018	0.020	-0.089	-1.531
LH : LL	-1.445	0.200	5.116	89.608	0.000	-0.659	-2.231

Solidarity

	.y.	n	statistic	DFn	DFd	p	method
1	sol	250	32.570	4	121.156	2.00E-18	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	1.440	0.162	6.299	95.299	0.000	2.076	0.804
CON : HL	-0.173	0.156	0.785	96.868	0.934	0.440	-0.787
CON : LH	0.760	0.189	2.838	84.844	0.044	1.506	0.014
CON : LL	-0.847	0.133	4.492	93.329	0.000	-0.322	-1.371
HH : HL	-1.613	0.170	6.726	97.632	0.000	-0.947	-2.280
HH : LH	-0.680	0.201	2.397	92.602	0.125	0.109	-1.469
HH : LL	-2.287	0.149	10.862	85.758	0.000	-1.700	-2.873
HL : LH	0.933	0.196	3.364	89.988	0.010	1.706	0.161
HL : LL	-0.673	0.143	3.334	88.691	0.011	-0.111	-1.236
LH : LL	-1.607	0.179	6.363	74.127	0.000	-0.901	-2.313

Enjoyment/Interest

	.y.	n	statistic	DFn	DFd	p	method
1	imi	250	8.750	4	122.320	3.03E-06	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	1.331	0.185	5.095	96.525	0.000	2.058	0.605
CON : HL	0.623	0.194	2.275	97.945	0.162	1.384	-0.138
CON : LH	0.723	0.207	2.473	96.997	0.105	1.535	-0.090
CON : LL	0.094	0.187	0.356	97.100	0.996	0.830	-0.641
HH : HL	-0.709	0.182	2.747	97.027	0.054	0.008	-1.426
HH : LH	-0.609	0.196	2.193	93.378	0.191	0.163	-1.380
HH : LL	-1.237	0.175	4.986	97.925	0.000	-0.548	-1.927
HL : LH	0.100	0.205	0.346	96.490	0.997	0.904	-0.704
HL : LL	-0.529	0.185	2.024	97.485	0.263	0.197	-1.255
LH : LL	-0.629	0.198	2.241	94.374	0.174	0.152	-1.400

Number of errors

	.y.	n	statistic	DFn	DFd	p	method
1	errors	250	5.770	4	122.273	2.73E-04	Welch ANOVA

groups	Mean Difference	Standard Error	t	df	p	upper limit	lower limit
CON : HH	0.944	0.149	4.490	96.823	0.000	1.528	0.360
CON : HL	-0.358	0.147	1.719	97.163	0.427	0.221	-0.937
CON : LH	0.442	0.179	1.742	85.108	0.414	1.149	-0.265
CON : LL	-0.994	0.122	5.772	88.587	0.000	-0.514	-1.474
HH : HL	-1.302	0.155	5.929	97.970	0.000	-0.692	-1.912
HH : LH	-0.502	0.186	1.907	90.327	0.321	0.231	-1.235
HH : LL	-1.938	0.131	10.429	83.241	0.000	-1.420	-2.456
HL : LH	0.800	0.185	3.059	89.534	0.024	1.528	0.072
HL : LL	-0.636	0.130	3.465	84.105	0.007	-0.124	-1.148
LH : LL	-1.436	0.165	6.139	69.861	0.000	-0.781	-2.091

Appendix J.

Questionnaires Used in Study 3

Athlete Burnout Questionnaire

Following are statements about how you may or may not be feeling about competing in football. Using the scale provided, please indicate how true each of the following statements is for you.

	Almost never	Rarely	Sometimes	Frequently	Almost always
1. I'm accomplishing many worthwhile things in football	1	2	3	4	5
2. I feel so tired from my training that I have trouble finding energy to do other things	1	2	3	4	5
3. The effort I spend in football would be better spent doing other things	1	2	3	4	5
4. I feel overly tired from my football participation	1	2	3	4	5
5. I am not achieving much in football	1	2	3	4	5
6. I don't care as much about my football performance as I used to	1	2	3	4	5
7. I am not performing up to my ability in football	1	2	3	4	5
8. I feel "wiped out" from football	1	2	3	4	5
9. I'm not into football like I used to be	1	2	3	4	5
10. I feel physically worn out from football	1	2	3	4	5
11. I feel less concerned about being successful in football than I used to	1	2	3	4	5
12. I am exhausted by the mental and physical demands of football	1	2	3	4	5
13. It seems that no matter what I do, I don't perform as well as I should	1	2	3	4	5
14. I feel successful at football	1	2	3	4	5
15. I have negative feelings toward football	1	2	3	4	5

Basic Psychological Needs Satisfaction in Sports Scale

Using a 7-point scale (1 = "not true at all"; 4 = "somewhat true"; 7 = 'Very true"), please indicate how true each of the phrases are to you and answer the questions according to your feelings and experiences when participating in football in the past 2-weeks.

In the following questions, "my sport" refers to your participation in football.

	Not true at all						Very true
1. I can overcome challenges in my sport.	1	2	3	4	5	6	7
2. I am skilled at my sport.	1	2	3	4	5	6	7
3. I feel I am good at my sport.	1	2	3	4	5	6	7
4. I get opportunities to feel that I am good at my sport.	1	2	3	4	5	6	7
5. I have the ability to perform well in my sport.	1	2	3	4	5	6	7
6. In my sport, I get opportunities to make choices.	1	2	3	4	5	6	7
7. In my sport, I have a say in how things are done.	1	2	3	4	5	6	7
8. In my sport, I can take part in the decision-making process.	1	2	3	4	5	6	7
9. In my sport, I get opportunities to make decisions.	1	2	3	4	5	6	7
10. In my sport, I feel I am pursuing goals that are my own	1	2	3	4	5	6	7
11. In my sport, I really have a sense of wanting to be there.	1	2	3	4	5	6	7
12. In my sport, I feel I am doing what I want to be doing.	1	2	3	4	5	6	7
13. I feel I participate in my sport willingly.	1	2	3	4	5	6	7
14. In my sport, I feel that I am being forced to do things that	1	2	3	4	5	6	7
15. I don’t want to do.	1	2	3	4	5	6	7
16. I choose to participate in my sport according to my own free will.	1	2	3	4	5	6	7
17. In my sport, I feel close to other people.	1	2	3	4	5	6	7
18. I show concern for others in my sport.	1	2	3	4	5	6	7
19. There are people in my sport who care about me.	1	2	3	4	5	6	7
20. In my sport, there are people who I can trust.	1	2	3	4	5	6	7

Four-Item Social Identification

For each of the following statements, please indicate how true it is for you, using the following scale:

	Strongly disagree						Strongly agree
1. I identify with my team	1	2	3	4	5	6	7
2. I feel committed to my team	1	2	3	4	5	6	7
3. I am glad to be a member of my team	1	2	3	4	5	6	7
4. Being a member of my team is an important part of how I see myself	1	2	3	4	5	6	7

Physical Health Questionnaire

The following items focus on how you have been feeling physically during the past over the past 2-weeks. Please respond by circling the appropriate number.

	Not true at all	Rarely	Once in a while	Some of the time	Fairly often	Often	All of the time
1. How often have you had difficulty getting to sleep at night?	1	2	3	4	5	6	7
2. How often have you woken up during the night?	1	2	3	4	5	6	7
3. How often have you had nightmares or disturbing dreams?	1	2	3	4	5	6	7
4. How often has your sleep been peaceful and undisturbed?	1	2	3	4	5	6	7
5. How often have you experienced headaches?	1	2	3	4	5	6	7
6. How often did you get a headache when there was a lot of pressure on you to get things done?	1	2	3	4	5	6	7
7. How often did you get a headache when you were frustrated because things were not going the way they should have or when you were annoyed at someone?	1	2	3	4	5	6	7
8. How often have you suffered from an upset stomach (indigestion)?	1	2	3	4	5	6	7
9. How often did you have to watch that you ate carefully to avoid stomach upsets?	1	2	3	4	5	6	7
10. How often did you feel nauseated (“sick to your stomach”)?	1	2	3	4	5	6	7
11. How often were you constipated or did you suffer from diarrhea?	1	2	3	4	5	6	7
12. How many times have you had minor colds (that made you feel uncomfortable but didn’t keep you sick in bed or make you miss work)?	0 times	1–2 time	3 times	4 times	5 times	6 times	7 times
13. How many times have you had respiratory infections more severe than minor colds that “laid you low” (such as bronchitis, sinusitis, etc.)?	0 times	1–2 time	3 times	4 times	5 times	6 times	7 times
14. When you had a bad cold or flu, how long did it typically last?	1 day	2 days	3 days	4 days	5 days	6 days	7 days

Sports Motivation Scale 2

Please think about why your practice your primary sport and respond to the questions below. Using the following scale, please indicate to what extent each of the following items corresponds to one of the reasons for which you are presently practicing your sport.

	Does not correspond at all	Corresponds very little	Corresponds a little	Corresponds moderately	Corresponds quite a bit	Corresponds quite a lot	Corresponds completely
1. Because I would feel bad about myself if I did not take the time to do it.	1	2	3	4	5	6	7
2. I used to have good reasons for doing sports, but now I am asking myself if I should continue.	1	2	3	4	5	6	7
3. Because it is very interesting to learn how I can improve.	1	2	3	4	5	6	7
4. Because practicing sports reflects the essence of whom I am.	1	2	3	4	5	6	7
5. Because people I care about would be upset with me if I didn't.	1	2	3	4	5	6	7
6. Because I found it is a good way to develop aspects of myself that I value.	1	2	3	4	5	6	7
7. Because I would not feel worthwhile if I did not.	1	2	3	4	5	6	7
8. Because I find it enjoyable to discover new performance strategies.	1	2	3	4	5	6	7
9. I don't know anymore; I have the impression that I am incapable of succeeding in this sport.	1	2	3	4	5	6	7
10. Because participating in sport is an integral part of my life.	1	2	3	4	5	6	7
11. Because I have chosen this sport as a way to develop myself.	1	2	3	4	5	6	7
12. It is not clear to me anymore; I don't really think my place is in sport.	1	2	3	4	5	6	7
13. Because through sport, I am living in line with my deepest principles.	1	2	3	4	5	6	7
14. Because people around me reward me when I do.	1	2	3	4	5	6	7
15. Because I feel better about myself when I do.	1	2	3	4	5	6	7
16. Because it gives me pleasure to learn more about my sport.	1	2	3	4	5	6	7
17. Because it is one of the best ways I have chosen to develop other aspects of myself.	1	2	3	4	5	6	7
18. Because I think others would disapprove of me if I did not.	1	2	3	4	5	6	7

Appendix K.

Analysis of Variance for Latent Profiles at Time 1 and 2 for Study 3

Time One

```
[1] "Intrinsic motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  351.5  117.18   241.1 <2e-16 ***
Residuals   334  162.4    0.49
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = inm ~ C, data = as.data.frame(data3))

$C
         diff        lwr        upr     p adj
1-3  3.8004719  3.3753713  4.2255725 0.0000000
2-3  2.1275429  1.7180514  2.5370343 0.0000000
4-3  3.3019970  2.8533183  3.7506756 0.0000000
2-1 -1.6729290 -1.9048558 -1.4410022 0.0000000
4-1 -0.4984749 -0.7941425 -0.2028073 0.0001049
4-2  1.1744541  0.9017050  1.4472032 0.0000000

     eta.sq eta.sq.part
C 0.6840666   0.6840666
[1] "Integrated motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  215.2   71.75   61.99 <2e-16 ***
Residuals   334  386.6    1.16
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = igm ~ C, data = as.data.frame(data3))

$C
         diff        lwr        upr     p adj
1-3  2.7240220  2.0680533  3.3799908 0.0000000
2-3  1.1845623  0.5526799  1.8164447 0.0000118
4-3  2.0585485  1.3661967  2.7509003 0.0000000
2-1 -1.5394597 -1.8973438 -1.1815756 0.0000000
4-1 -0.6654735 -1.1217155 -0.2092316 0.0011188
4-2  0.8739862  0.4531096  1.2948627 0.0000009

    eta.sq eta.sq.part
C 0.357652    0.357652
[1] "Identified motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  435.2  145.07   245.7 <2e-16 ***
Residuals   334  197.2    0.59
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = idm ~ C, data = as.data.frame(data3))

$C
         diff        lwr         upr     p adj
1-3  3.9717413  3.5031896  4.44029305 0.0000000
2-3  2.0824008  1.6310537  2.53374789 0.0000000
4-3  3.6934455  3.1989057  4.18798522 0.0000000
2-1 -1.8893405 -2.1449735 -1.63370759 0.0000000
4-1 -0.2782959 -0.6041848  0.04759304 0.1239756
4-2  1.6110447  1.3104169  1.91167245 0.0000000

     eta.sq eta.sq.part
C 0.6881395   0.6881395
[1] "Introjected motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  155.8   51.92   46.95 <2e-16 ***
```

```
Residuals   334  369.4    1.11
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = ijm ~ C, data = as.data.frame(data3))

$C
          diff         lwr        upr     p adj
1-3  1.7791687  1.13794908  2.4203883 0.0000000
2-3  0.7446798  0.12700497  1.3623547 0.0107907
4-3  2.1954682  1.51868355  2.8722528 0.0000000
2-1 -1.0344889 -1.38432616 -0.6846516 0.0000000
4-1  0.4162995 -0.02968409  0.8622831 0.0771036
4-2  1.4507884  1.03937500  1.8622017 0.0000000

     eta.sq eta.sq.part
C 0.2966138   0.2966138
[1] "External motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  345.2  115.06   152.5 <2e-16 ***
Residuals   334  252.0    0.75
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = exm ~ C, data = as.data.frame(data3))

$C
          diff        lwr        upr     p adj
1-3  0.8540145  0.3243941 1.38363499 0.0002328
2-3  0.6279322  0.1177588 1.13810572 0.0087686
4-3  3.2500955  2.6910998 3.80909113 0.0000000
2-1 -0.2260823 -0.5150332 0.06286861 0.1825708
4-1  2.3960809  2.0277172 2.76444462 0.0000000
4-2  2.6221632  2.2823530 2.96197337 0.0000000

    eta.sq eta.sq.part
C 0.578023    0.578023
[1] "Amotivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  119.3   39.77   35.42 <2e-16 ***
Residuals   334  375.0    1.12
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = amm ~ C, data = as.data.frame(data3))

$C
         diff        lwr       upr     p adj
1-3 0.0414119 -0.6046439 0.6874677 0.9983848
2-3 0.1722067 -0.4501267 0.7945401 0.8913208
4-3 1.6591227  0.9772337 2.3410117 0.0000000
2-1 0.1307948 -0.2216810 0.4832706 0.7732847
4-1 1.6177108  1.1683636 2.0670580 0.0000000
4-2 1.4869160  1.0723998 1.9014323 0.0000000

     eta.sq eta.sq.part
C 0.2413772   0.2413772
```

Time Two

```
[1] "Intrinsic motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  195.4   65.13   97.33 <2e-16 ***
Residuals   190  127.1    0.67
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = inm ~ C, data = as.data.frame(data4))

$C
          diff        lwr        upr     p adj
1-2  1.7520391  1.3178838  2.1861944 0.0000000
3-2 -1.8047050 -2.2724250 -1.3369850 0.0000000
4-2  0.4932626  0.1112653  0.8752599 0.0054006
3-1 -3.5567441 -4.1069365 -3.0065517 0.0000000
4-1 -1.2587765 -1.7382258 -0.7793272 0.0000000
4-3  2.2979676  1.7879256  2.8080096 0.0000000

  eta.sq eta.sq.part
C 0.6058      0.6058
[1] "Integrated motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  177.9   59.31   52.38 <2e-16 ***
Residuals   190  215.1    1.13
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = igm ~ C, data = as.data.frame(data4))

$C
          diff         lwr        upr     p adj
1-2  1.4553390  0.89058000  2.0200979 0.0000000
3-2 -1.9206779 -2.52909855 -1.3122572 0.0000000
4-2  0.4597064 -0.03720438  0.9566172 0.0809282
3-1 -3.3760168 -4.09171949 -2.6603142 0.0000000
4-1 -0.9956326 -1.61931108 -0.3719541 0.0003054
4-3  2.3803843  1.71691014  3.0438584 0.0000000

     eta.sq eta.sq.part
C 0.4526734   0.4526734
[1] "Identified motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  224.9   74.97   101.9 <2e-16 ***
Residuals   190  139.8    0.74
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = idm ~ C, data = as.data.frame(data4))

$C
          diff        lwr        upr     p adj
1-2  1.7414715  1.2862259  2.1967170 0.0000000
3-2 -2.0351447 -2.5255854 -1.5447040 0.0000000
4-2  0.6183692  0.2178153  1.0189231 0.0005196
3-1 -3.7766162 -4.3535356 -3.1996967 0.0000000
4-1 -1.1231023 -1.6258421 -0.6203624 0.0000002
4-3  2.6535139  2.1186952  3.1883325 0.0000000

     eta.sq eta.sq.part
C 0.6167106   0.6167106
[1] "Introjected motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  164.8   54.94   56.86 <2e-16 ***
```

```
Residuals   190  183.6    0.97
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = ijm ~ C, data = as.data.frame(data4))

$C
           diff        lwr        upr     p adj
1-2  1.46814447  0.9464555  1.9898334 0.0000000
3-2 -1.15371748 -1.7157384 -0.5916966 0.0000017
4-2  1.40506492  0.9460499  1.8640799 0.0000000
3-1 -2.62186195 -3.2829832 -1.9607407 0.0000000
4-1 -0.06307955 -0.6391947  0.5130356 0.9920065
4-3  2.55878241  1.9459066  3.1716582 0.0000000

    eta.sq eta.sq.part
C 0.473082    0.473082
[1] "External motivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  236.6   78.87   120.9 <2e-16 ***
Residuals   190  124.0    0.65
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = exm ~ C, data = as.data.frame(data4))

$C
          diff        lwr         upr     p adj
1-2  0.6440402  0.2152902  1.07279010 0.0007834
3-2 -0.5601585 -1.0220552 -0.09826175 0.0103741
4-2  2.4799966  2.1027552  2.85723799 0.0000000
3-1 -1.2041987 -1.7475410 -0.66085631 0.0000002
4-1  1.8359564  1.3624764  2.30943650 0.0000000
4-3  3.0401551  2.5364633  3.54384692 0.0000000

     eta.sq eta.sq.part
C 0.6561654   0.6561654
[1] "Amotivation"
             Df Sum Sq Mean Sq F value Pr(>F)
C             3  106.9   35.64   34.65 <2e-16 ***
Residuals   190  195.4    1.03
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
  Tukey multiple comparisons of means
    95% family-wise confidence level

Fit: aov(formula = amm ~ C, data = as.data.frame(data4))

$C
            diff        lwr       upr     p adj
1-2 -0.199630021 -0.7379373 0.3386772 0.7716038
3-2 -0.007683893 -0.5876079 0.5722401 0.9999854
4-2  1.665883236  1.1922464 2.1395201 0.0000000
3-1  0.191946128 -0.4902350 0.8741273 0.8852520
4-1  1.865513258  1.2710461 2.4599804 0.0000000
4-3  1.673567130  1.0411683 2.3059660 0.0000000

     eta.sq eta.sq.part
C 0.3536256   0.3536256
```