

THE ROLE OF SOCIAL IDENTIFICATION AND SOCIAL SUPPORT IN  
PSYCHOPHYSIOLOGICAL RESPONSES TO STRESS

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## CONTENTS

ACKNOWLEDGEMENTS .....	II
ABSTRACT.....	VIII
LIST OF TABLES .....	X
LIST OF FIGURES .....	XII
LIST OF APPENDICES.....	XIII
PREFACE.....	XIV
CHAPTER 1: LITERATURE REVIEW .....	16
1.1 Introduction: What is Stress? .....	16
1.2 Early Theories of Stress .....	17
1.3 Lazarus and the Cognitive Appraisal Process .....	23
1.4 Psychophysiological Responses to Stress.....	27
1.5 The Biopsychosocial Model (BPSM) .....	32
1.6 The Theory of Challenge and Threat States in Athletes (TCTSA) .....	35
1.6.1 The Development of the TCTSA.....	36
1.6.2 Demand and Resource Appraisals.....	36
1.6.3 Physiological and Emotional Components of the TCTSA.....	40
1.7 Research Studies on Challenge and Threat .....	41
1.7.1 Individual Differences .....	41
1.7.2 Performance.....	45
1.7.3 Challenge and Threat Manipulations.....	47

1.7.4 Summary of Challenge and Threat States .....	51
1.7.5 Social Influences.....	53
1.8 Social Support and Stress .....	56
1.9 The Social Identity Approach .....	64
1.9.1 Outcomes of a Shared Identity .....	67
1.9.2 Social Identity and Stress .....	68
1.9.3 The Effect of Social Support and Social Identification on Cardiovascular Reactivity .....	72
1.10 Summary and Aims of Thesis .....	80
1.10.1 Aims.....	82
<b>CHAPTER 2: THE ROLE OF SOCIAL SUPPORT AND SOCIAL IDENTIFICATION ON CHALLENGE AND THREAT COGNITIVE APPRAISALS, PERCEIVED STRESS, AND LIFE SATISFACTION IN WORKPLACE EMPLOYEES. ....</b>	<b>84</b>
2.1 Introduction .....	84
2.2 Method .....	92
2.2.1 Participants .....	92
2.2.2 Measures .....	92
2.2.3 Procedure .....	95
2.2.4 Analytic strategy.....	95
2.3 Results .....	96
2.4 Discussion .....	103

CHAPTER 3: THE EFFECT OF SOCIAL SUPPORT AND SOCIAL IDENTIFICATION  
ON CHALLENGE AND THREAT STATES, PERCEIVED STRESS AND LIFE

SATISFACTION.....	109
3.1 Introduction.....	109
3.2 Method.....	114
3.2.1 Participants.....	114
3.2.2 Measures.....	114
3.2.3 Procedure.....	117
3.2.4 Analytic strategy.....	117
3.3 Results.....	118
3.4 Discussion.....	124

CHAPTER 4: “THE CHOICE IS YOURS”: SELECTING SOCIAL SUPPORT ON  
APPROACH TO A HYPOTHETICAL SPEECH TASK.....

131	131
4.1 Introduction.....	131
4.2 Method.....	136
4.2.1 Participants.....	136
4.2.2 Measures.....	136
4.2.3 Procedure.....	137
4.2.4 Analytic strategy.....	138
4.3 Results.....	140
4.4 Discussion.....	145

CHAPTER 5: THE ROLE OF SOCIAL SUPPORT AND RELATIONAL IDENTIFICATION IN CHALLENGE AND THREAT APPROACHES TO PSYCHOLOGICAL STRESSORS.....	152
5.1 Introduction.....	152
5.2 Study 1.....	156
5.3 Method.....	157
5.3.1 Participants.....	157
5.3.2 Measures.....	157
5.3.3 Procedure.....	160
5.3.4 Analytic strategy.....	162
5.4 Results.....	164
5.5 Discussion.....	171
5.6 Study 2.....	173
5.7 Method.....	174
5.7.1 Participants.....	174
5.7.2 Measures.....	174
5.7.3 Procedure.....	175
5.7.4 Analytic strategy.....	176
5.8 Results.....	177
5.9 Discussion.....	183
5.10 General Discussion.....	184
CHAPTER 6: GENERAL DISCUSSION.....	191

6.1 Summary of Findings .....	191
6.2 Significance and Implications of Findings.....	194
6.2.1 Theoretical Implications .....	194
6.2.2 Applied Implications .....	217
6.3 Strengths and Limitations.....	222
6.4 Future Research Directions .....	229
6.5 Conclusion.....	235
CHAPTER 7: REFERENCES .....	237
APPENDICES .....	304
APPENDIX 1: INFORMATION SHEET, CONSENT FORM, AND QUESTIONNAIRES USED FOR CHAPTER TWO .....	304
APPENDIX 2: INFORMATION SHEET, CONSENT FORM, AND QUESTIONNAIRES USED FOR CHAPTER THREE .....	313
APPENDIX 3: INFORMATION SHEET, CONSENT FORM, SCRIPT AND QUESTIONNAIRES USED FOR CHAPTER FOUR.....	323
APPENDIX 4: INFORMATION SHEET, CONSENT FORM, SCRIPTS AND QUESTIONNAIRES USED FOR CHAPTER FIVE (STUDY 1).....	339
APPENDIX 5: INFORMATION SHEET, CONSENT FORM, SCRIPTS AND QUESTIONNAIRES USED FOR CHAPTER FIVE (STUDY 2).....	365

## ABSTRACT

An individuals' psychophysiological response to stress is dependent on a transaction between the person and the environment. Within theories such as the Biopsychosocial Model (BPSM) and the Theory of Challenge and Threat States in Athletes (TCTSA), it is proposed that individuals respond to a motivated situation with either a challenge or threat state which are marked by differential cardiovascular reactivity (CVR). A challenge state is typically associated with adaptive emotions and behaviours, and superior performance outcomes, when compared with a threat state. Individualistic appraisals have provided the foundation for these theories, neglecting socially derived perceptions of group resources. The aim of this thesis was to explore the role of social factors, namely social support, and identification to others, on challenge and threat states. Within this thesis five studies are reported across four chapters. Chapter two provides cross-sectional evidence to demonstrate the influential role that social support and social identification can have on perceived stress, life satisfaction, intentions to quit, and overall job performance in workplace employees. Chapter three then offers cross-sectional evidence of relationships between social support and social identification and challenge and threat states, perceived stress, and life satisfaction across a range of group contexts. Chapter four provides experimental evidence of the associations between choice of social support and relational identification on changes to individuals' resource appraisals (self-efficacy, perceived control, achievement goals) and anxiety on approach to a hypothetical speech task. Then, chapter five offers two experimental laboratory studies to examine the effects of social support and relational identification on CVR on approach to an acute stress task and found relationships between social support and resource appraisals. No differences were found for CVR between the support conditions (support from a friend or stranger), but sex differences emerged. Theoretical explanations and implications of the findings are provided in chapter six relating to the role of social support and social (and



relational) identification in challenge and threat responses, and sex differences in social support and challenge and threat including physiological markers. This thesis makes an original and significant contribution to challenge and threat, social support, and social identity literatures by examining how these psychosocial factors can play a role in the human stress response.

## LIST OF TABLES

Table 2. 1 Means, Standard Deviations, and Bivariate Correlations for all variables (Chapter 2).....	98
Table 2. 2 Hierarchical regression analyses for challenge and threat, social identity and social support, predicting perceived stress and life satisfaction.....	101
Table 2. 3 Hierarchical regression analyses for challenge and threat, social identity, social support, perceived stress and life satisfaction predicting intentions to quit, absenteeism and job performance. ....	102
Table 3.1 Means, Standard Deviations, and Bivariate Correlations for all variables.....	120
Table 3.2 MANOVA and univariate ANOVA results for between groups and sex differences .....	121
Table 3.3 Hierarchical regression analyses for resource appraisals, challenge and threat, social identity, and social support, predicting perceived stress .....	122
Table 3.4 Hierarchical regression analyses for resource appraisals, challenge and threat, social identity, social support and perceived stress predicting life satisfaction.....	123
Table 4.1 Means, Standard Deviations, and Bivariate Correlations for all variables.....	140
Table 4.2 Means and Standard Deviations across the conditions.....	142
Table 4.3 Hierarchical regression analyses for sex, choice of support, and social support predicting resource appraisals change .....	143
Table 4.4 Hierarchical regression analyses for sex, choice of support, social support and resource appraisal change predicting anxiety change.....	144
Table 5.1 Means, Standard Deviations, and Bivariate Correlations for all key variables.....	166
Table 5.2 Means and Standard Deviations across the conditions.....	167

Table 5.3 Means, Standard Deviations, and Bivariate Correlations for all variables.....	179
Table 5.4 Means and Standard Deviations across the conditions for key variables.....	180

**LIST OF FIGURES**

Figure 1.1 An adapted overview of Jones' et al. (2009) TCTSA incorporating social support and social identification. Boxes with dotted lines represents how this thesis proposes to extend current theory .....	83
Figure 4.1 An overview of the data collection protocol. ....	138
Figure 5.1 An overview of the data collection protocol for study 1.....	162
Figure 5.2 An overview of the data collection protocol for study 2.....	176

**LIST OF APPENDICES**

**Appendix 1:** Information sheet, consent form, and questionnaires used for chapter two

**Appendix 2:** Information sheet, consent form, and questionnaires used for chapter three

**Appendix 3:** Information sheet, consent form, script and questionnaires used for chapter four

**Appendix 4:** Information sheet, consent form, scripts and questionnaires used for chapter five (study 1)

**Appendix 5:** Information sheet, consent form, scripts and questionnaires used for chapter five (study 2)

## PREFACE

This thesis includes manuscripts in preparation. The data from this thesis has also been presented at various Institutional, National, and International conferences. The details of all outputs related to this thesis are below:

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## CHAPTER 1: LITERATURE REVIEW

### 1.1 Introduction: What is Stress?

Stress is present in everyday life and can manifest in the short-term (acute), and long term (chronic). Yet, despite its prevalence, the concept of stress has been somewhat difficult to define (Segerstrom & Miller, 2004), largely because researchers from various disciplines have formulated their own definitions of stress. For example, biologists refer to conditions such as heat and cold having an impact on organisms. Whereas social scientists are more concerned with a person's interaction with the environment. Early definitions come from Selye (1956) who described stress as the non-specific response of the body to any demand for change. This definition arose from a series of laboratory experiments on animals and their exposure to extremes of heat and cold, and deafening noises. It was from these findings on animals that ideas about how humans react to stress were formed. Two decades later, Selye (1979) expanded his view of stress, suggesting that it was a 'perception'. Further, Selye suggested it is the demands that are imposed upon us because there are too many alternatives and stress is caused by being conscientious and hardworking. However, since these definitions, interest has moved towards the idea that stressors or stimuli present in an individual's environment is the source of stress. For example, Levi (1996) suggested that stress is caused by a multitude of demands (stressors), such as an inadequate fit between what we need and what we are capable of, and what our environment offers and what it demands of us. The term 'stressors', is used for the stimulus that creates the stress response. Acute stressors are not typically associated with major health problems, however more chronic stressors can lead to adverse health conditions such as increased risk of cardiovascular disease (Marmot et al., 1997), depression (Hammen, 2005), and susceptibility to upper respiratory diseases (Cohen et al., 1991). Chronic stressors could be in response to the accumulation of everyday stressors over-time, that are poorly managed or ignored, as well as



exposure to traumatic events. The terms ‘stress’ and ‘stress response’ in this thesis are used to refer to the psychological and physiological responses to a demand.

The human stress response has largely been considered to occur based on egocentric factors (e.g., personality, attitudes, and personal control). Nevertheless, given that humans are social mammals and have a need to belong (Baumeister & Leary, 1995), it is important that these social derived perceptions are considered when examining psychological stress. Indeed, some researchers’ have recognised the importance of social factors in the transactional stress process. For example, a factor that can influence how a person manages stress is an individual’s perceptions of social support and psychological connection to others (e.g., Cobb, 1976; Cohen & McKay, 1984; Haslam et al., 2004).

This literature review begins by exploring the early approaches to understanding stress. Then attention will move to contemporary theories that specifically inform the studies in this thesis; specifically, the Biopsychosocial Model of Challenge and Threat (BPSM; Blascovich & Mendes, 2000) and the Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009). Then, the review will focus on the social aspects that can influence the stress response, namely social support and the social identity approach (Tajfel & Turner, 1979).

## **1.2 Early Theories of Stress**

The understanding of stress in recent times was manifested and influenced by ancient Greek philosophers. The Greeks explained the power of human reason to understand nature, and the influence this can have on the internal environment. For example, Hippocrates (460-377 BC) and Aristotle (384-322 BC) both expressed the importance of the body’s requirement for internal balance (i.e., the four humors). Aristotle also noted that both the heart and the brain together formed a unit that controlled the body. Aristotle’s view that the

heart was central to thought and reason, was opposed by Hippocrates, who believed it was the brain that was more important. Nevertheless, despite some of these disagreements and contrasting views, it was the common view amongst Greek philosophers that both the heart and brain played a pivotal role in the interaction between the environment, body, and mind, which is fundamental in more recent understandings of stress. Galen would then expand on Hippocrates Corpus' theory of the four humours in the second century introducing three types of spirits (life, animal, natural). Galen also agreed with Hippocrates about the existence of four temperaments (personality traits) and supported the link to the four humours, relating one's personality to one's physical nature. Galen's belief and views dominated medicine, and it was not until the 17<sup>th</sup> century which marked the next significant step in clarifying and understanding the human stress response.

The 17<sup>th</sup> century then saw the work of Descartes (1637) who put forth the idea of 'mind-body dualism'. Descartes viewed humans as biological machines having a nonphysical mind situated in our physical bodies. Furthermore, the nonphysical mind (or soul) could influence the physical body through the pineal gland to the nervous system to the muscles and internal organs (Lovallo, 2005). Descartes would often compare living things with machines when demonstrating the mind-body relationship. However, perhaps one of the most influential links showing a relationship between living things (humans) and machines comes from Hooke's Law (1678). Robert Hooke studied Descartes work and developed the law of elasticity (Hooke's Law), which describes how objects respond to loads ("stress") and depending on the force placed on them ("stretch"), this will determine whether they revert to their original state. It was then that similarities were made to the human body. For example, like a machine, the body is also subject to wear and tear, and needs sufficient energy to withstand this stress.

In line with the mechanistic workings proposed by Descartes and Hooke, French physiologist Claude Bernard (e.g., 1865) put forward the idea that all living organisms had an internal environment that contributed to their behaviour. Furthermore, the maintenance of life in living organisms was dependant on keeping the internal environment constant in the face of a changing external environment. For example, mammals have internal circulation that can change relatively to the external environment, such as the regulation of body temperature and oxygenation of the cells (Lovallo, 2005). This homeostatic concept is somewhat the underpinning aspect when trying to understand stress and the stress responses and was further developed by Walter Cannon.

Following Bernard's ideas on keeping the internal environment consistent with the changing external environment, Cannon, (1929a) took interest in this notion and termed it "homeostatis", which derived from the Greek ("homoios", meaning "similar" and "stasis" meaning "position" in Greek). Extending Bernard's work, Cannon, (1929a) suggested that the brain coordinates body systems, with the aim of maintaining set goal values for key internal variables. For example, the core temperature is kept at 98.6 F, the serum sodium level at 140 mEq/L, and the blood glucose level at 90 mg/dl. Furthermore, any disturbance in both the internal and external environments which disrupts homeostasis, would evoke the nervous and hormone systems resulting in externally observable behaviours in an attempt to reinstate homeostasis (Cannon, 1932) . In addition, the brain would also respond to these emergencies in the same way, by increasing the release of adrenaline (Goldstein, 2013). According to Cannon, there were a wide range of threats to homeostasis, for example, exposure to cold, traumatic pain, and emotional distress, and these would evoke fight-or-flight responses.

The fight-or-flight response was also a term first coined by Cannon (1932) which helped describe the responses made to an external stressor. Cannon believed that when put into a potentially dangerous situation our bodies react automatically in a way that results in

fight (be aggressive and attack) or flight (to flee and escape), to aid survival. The fight-or-flight response encompasses emotional components, neuroendocrine and physiological changes. The emotions associated with fight-or-flight generally have negative valence for example, anxiety, fear, and anger. Changes in endocrine responses, such as the release of adrenaline also occurs during a fight-or-flight response, which provides an increase in vigour and strength, accompanied with heightened physiological reactions, such increase respiration, blood flow, and oxygen to the muscles. These responses all help to enhance the prospect of a successful fight-or-flight response, to promote survival (Lovallo, 2005). In addition, the brain prepares the body for action through the activation of the sympathetic nervous system and the suppression of parasympathetic activity. As a result, an increase in blood supply and sugar availability provides a profusion of energy to the muscles to help respond most efficiently to the stressor (Cannon, 1929b).

Cannon's work is considered pioneering through advancing understanding of the autonomic nervous system and the regulation of the body, and by demonstrating the bodies' responses to a potentially dangerous situation. However, some of his work has been considered too simplistic. In particular, Cannon only looked at a single factor, the adrenaline response, and did not acknowledge other physiological and biochemical patterns that may play a role (Goldstein & Kopin, 2007). It was then the turn of Hans Selye, who is recognised as the 'father of stress' and who further developed the understanding of the physiological responses to external stressors.

In the mid-20<sup>th</sup> century Hans Selye truly revolutionised the concept of stress through his theory of General Adaptation Syndrome (GAS). Selye identified three stages by which a combination of specific and nonspecific responses aided an organism's survival. The first was called the alarm reaction, which is similar to Cannon's fight-or-flight response, in that it is the initial reaction to the stressor. The second is known as the resistance stage, whereby the

organism uses available energy to restore any damaged tissue and maintain the defences until the stressor was no longer present. Then finally, the stage of exhaustion which the organism is no longer able to maintain defences against the stressor and the energy systems are exhausted, leading to severe health problems, if not death, certainly in smaller mammals. Much of Selye's early work was carried out on animals and revealed that when subjected to acute but different noxious stimuli (stressors), such as extremes of heat or cold, infection, blaring light etc., they all exhibited similar patterned responses, these included stomach ulcers, decrease of the thymus gland, and enlargement of the adrenals. Selye did not use the term 'stress' in his early work. Instead he used the terms 'nocuous' and 'noxious', which was used to explain a non-specific response to change (Selye, 1936). Selye then adopted the term stress and defined it as "the non-specific response of the body to any demand made upon it" (1973, p. 692). Again, Selye emphasised stress as the non-specific response to a demand. It was only later that Selye recognised that not all reactions to stress resulted to the same emotional outcomes. Accordingly, Selye (1974) introduced the terms 'distress' and 'eustress'. Distress was considered bad, and associated with negative emotions and disturbed bodily state, whereas eustress was good and associated with more positive emotions and healthy bodily states. Nevertheless, this concept was not new as Levi (1971) was first to establish the idea of 'positive' and 'negative' stress in his work on society, stress and disease. However, Selye still maintained that stress is a non-specific response and did not outline any detail of physiological or psychological differences between eustress and distress.

Much of Selye's work was based on animal models of stress, therefore raising vital issues around the generalisability to humans (Shapiro, 1998). Criticism too was given for the generality of the non-specific response to stressors. For example, Mason (1975) found that there may be an increase, decrease, or no effect on physiological functioning in response to different stressors, opposing Selye's idea of a common response. In addition, Selye himself

was unable to conclude what caused the initial alarm reaction to a stressor, and his search was always physiological in nature (i.e., a chemical by-product; Selye, 1976). Therefore, it is apparent that there was a lack of an adequate explanation in Selye's understanding of the stress response. Nevertheless, this provided an avenue for further exploration and research.

In summary, early concepts of stress can be seen as early as ancient Greek philosophers and developed throughout the 17<sup>th</sup> to 20<sup>th</sup> century. The idea of stress started with the recognition of the internal environment, and the importance of it being protected from the external environment to maintain life. The second advance was this notion of homeostasis, where the internal environment acts to maintain this balance with varying external influences. Consequently, any imbalance would result in ill effects. Then came the notable work from Hans Selye, who was arguably the first to define the term stress and offer some useful physiological advances, in particular the non-specific responses to stressors. Common among these notions of stress is the influence of the surrounding environment. Behaviourists generally support the theory of *tabula rasa* (e.g., Locke, 1796), and would argue that humans are born with the mind as a blank slate and that behaviour is learnt from the environment. In this regard, stress responses are dictated and influenced by the situations in which one is placed in rather than any innate characteristics.

Nowadays however, it is rare that individuals may encounter situations that create a fight-or-flight response similar to ancestral history (e.g., attack from predators and coping with extreme environments). Nevertheless, there are still a number of stressors that do not necessarily require a physical response (e.g., academic assessments) but still have physiological responses (Segerstrom & Miller, 2004). In other words, it could be argued that our stress response is inappropriate to modern stressors. Considering this, much of the work outlined thus far has focused mainly on the physiological factors of stress in organisms, ignoring some of the important psychological aspects. Nonetheless, it was the work of

Richard Lazarus, who took particular interest in the view that stress is the perception of the certain threatening event. Therefore, this idea that cognition had a major role to play in stress and coping offers an alternative theory.

### **1.3 Lazarus and the Cognitive Appraisal Process**

It was the 1950's when Richard Lazarus first published research on the stress concept. Influenced by the work of Harold Wolff and Magda Arnold, Lazarus understood that physiological stress and psychological stress requires different analysis and was particularly interested in exploring the psychological aspect of stress. It was soon made clear that individuals respond to stress in different ways and that cognitive variables played a role in the stress response (Lazarus, Deese, & Osler, 1952). For example, Lazarus and Eriksen (1952) found that college students who were placed under stress, had a great deal of variability in performance on a mental test (e.g., some people performed better, while others performed worse under stress). The results also revealed that it was those with high academic standing who had improved performance under stress, while those with low academic standing did worse and their results more variable. It was concluded that this performance variability may not only be down to their academic standing, but also the individual's ability to cope with this stressful task.

In another set of studies (Lazarus & Alfert 1964; Speisman, Lazarus, Mordkoff, & Davison, 1964), participants were shown an anxiety provoking film while their skin resistance and heart rate (psychophysiological stress response) were measured. For example, one of the video's showed tribal rituals in which a surgical procedure was carried out. In one condition (denial orientation), the participants were told at the start that the procedure was harmless and the people in the film were not hurt. In another condition (intellectualization) the start gave an anthropological view on the ceremony, then in the last condition (trauma) gave emphasis on the mutilation and pain. The results compared the three conditions with a

control condition (no influence) and found significant effects on self-report distress and on the psychophysiological responses. For example, denial and intellectualization conditions reported lower stress reactions than the control, while the threat raised them. The findings from this study were interpreted as the differences in cognitions between the participants, resulting in the accompanying stress responses.

Lazarus then formulated the idea that it is how an individual perceives a stimuli which can impact the overall stress response (Lazarus, 1966). However, this concept was not entirely new, and had also been put forward by Harold Wolff some time earlier. Wolff's view was that stress response is predominantly the consequence of the way in which the situation is perceived (Wolff, 1953). Moreover, this perception depends on a number of different factors including "generic equipment, basic individual needs and longings, earlier conditioning influences, and a host of life experiences and culture pressures" (Wolff, 1953, p. 10). Nevertheless, Wolff's work lacked detail when it came to explaining the interaction between the environment and the individual, leading to the stress response. It was then the work from Magda Arnold in the 1960's on cognitive theory, which posits the first step in experiencing an emotion is an appraisal of the situation (Arnold, 1960). While Arnold's work was focused on emotions, Lazarus' was more concerned with stress. Therefore, when Lazarus (1966) introduced the appraisal theory, it offered a valuable contribution to stress research.

Lazarus and Folkman (1984) stated that a person's interaction with the environment causes emotions that lead to bodily stress responses. They suggest that individuals are constantly evaluating the series of events they encounter throughout their daily lives. This is also known as the appraisal process, which provides a foundation for Lazarus' cognitive appraisal theory. This theory has undergone a number of revisions (Lazarus & Folkman, 1984; Lazarus, 1991; Lazarus & Launier, 1978; Lazarus, 1999). The most recent version still posits that stress is the interaction between individual and environment, but this is influenced



by both primary and secondary appraisals. The primary appraisal involves the evaluation of motivational relevance and congruence. Motivational relevance refers to how important the individual perceives the situation to be to their well-being, whereas motivational congruence refers to the individual determining how consistent or inconsistent the situation is with their goals (Smith & Kirby, 2009). There are three types of primary appraisals: irrelevant, benign-positive, and stressful. An event is considered an irrelevant appraisal when it does not have any consequences on the individual's well-being. A benign-positive appraisal refers to a situation where an individual views the event as reinforcing or enhancing well-being. Lastly, a situation is appraised as stressful if there is forecast of harm, or the potential for damage to the individual's well-being. Largely, the primary appraisal is intended to identify potential danger and evolve a plan to be able to deal with the threat, leading to the secondary appraisal (Lazarus & Folkman, 1984).

Secondary appraisal is seen as the assessment of resources used to cope with the situation. These coping responses can also be classified into problem focused and emotion focused strategies (Lazarus & Folkman, 1984). Problem focused strategies are self-explanatory in a sense, in that they are designed to target the problem itself (e.g., time-management, seeking information, & problem solving). This is done through a series of behaviours to gather information and the alteration of beliefs, usually ending up in a suitable coping response. On the other hand, emotional focus strategies are based around psychological changes that limit the extent to which disrupted emotions are caused by an event, reducing the level of threat (e.g., distraction, emotional disclosure, & relaxation techniques). In general, our appraisals are largely responsible for the nature and extent of both the psychological and physiological reactions to a given situation (e.g., sporting competition, job interviews, & public speaking).

Broadly, the primary and secondary appraisals result in different outcomes of stress, namely: harm, threat, and challenge (Lazarus & Folkman, 1984; Lazarus, 1966; Lazarus & Launier, 1978). This is also commonly known as the transactional model. Harm refers to psychological damage that has already happened, whereas both threat and challenge refer to imminent events. Threat is the anticipation of potential harm, and challenge relates to the level of confidence in the face of difficult demands by the utilisation of coping resources. In sum, these imminent responses to stress can be seen as similar to the fight-or-flight responses put forward by Cannon, and Selye's eustress and distress idea, by proposing two distinct stress responses, one seen as adaptive, the other maladaptive.

It should be noted that the transaction process between the individual and environment is also acknowledged among social psychologists who advocate that the social constraints (i.e., society, cultural differences, race, socioeconomic status etc) are manifested in human thought and action (McLeod & Lively, 2007). Lazarus (1999) recognized the person-environment interactions as all part of the appraisal process, but specific mechanisms were never detailed. As such, when it comes to coping, both personal and social attributes are drawn upon by an individual when faced with stress (Pearlin & Schooler, 1978).

To conclude, Lazarus extends Cannon's and Selye's concepts on the stress response by looking at the cognitive approach. The appraisal theory offers a useful framework for researchers in the field to explore various stressful environments. An example of this comes from those that have examined stress and pressure in a performance environment. These studies are typically concerned with both the cognitive and psychophysiological responses to an individual's preparedness for competition, and the impact this has on actual performance levels. These situations are often referred to as a motivated performance situation (e.g., exam, speech, sporting competition). The changes in the physiological functions prior to these motivated performance situations include activity in the sympathetic activation resulting in

increased heart rate, increased cardiac output, increased sympathetic outflow to the blood vessels, and increased epinephrine secretion (Lovallo, 2005). While some of the physiological responses to stress were acknowledged by Cannon, Selye, and Lazarus, the exact link between the psychological stress (e.g., the appraisal process) and the physiological outcomes were relatively unknown. The next section of this review will explore some of the advances made in the physiological responses to stress.

#### **1.4 Psychophysiological Responses to Stress**

The physiological response to stress offers a valuable framework to understand some of the mechanisms involved in both health and performance outcomes. In particular, the neuroendocrine response to stress can elicit changes in the body such as hyperventilation, elevated blood pressure, increased heart rate, a sudomotor response (sweating), increased blood flow to skeletal muscles, and perturbations of gut function to enable body survival (Cuciureanu & Vink, 2011). There has been considerable attention specifically in the Sympathetic Adreno Medullary (SAM) and the Hypothalamic-Pituitary-adrenal (HPA) axis (sometimes referred to as Pituitary Adreno Cortical; PAC) systems and both Walter Cannon and Hans Selye acknowledged these systems in the stress response. However, most of their studies were animal experiments and showed the emergency function of the adrenal medulla during the fight-or-flight response. Since then, numerous studies have looked at humans to provide support for some of the early postulations. The following will explore some of this research and its development over the years.

It has been established that stress exposure causes the hypothalamus in the central nervous system to activate the SAM system which then results in the secretion of catecholamines (e.g., epinephrine & norepinephrine). As a result, the catecholamines mobilize energy to the heart, muscles, and to the brain, while at the same time reduce the blood flow to the internal organs and the gastrointestinal system (Lundberg, 2007). This then

can be seen as a fairly helpful response to a threatening situation and central to the fight-or-flight response. Early work on catecholamines were around the period 1960 to 1980 using a fluorophotometric method developed by Euler and Lishajko (1961) which involved using urinary analysis to detect catecholamines. This method of analysis resulted in numerous investigations led by Scandinavian researchers to explore the role of catecholamines on the stress response.

A review by Lundberg (1984) detailed some of the early work which was interested in the relationship between psychological and physiological arousal. It was found that psychophysiological arousal was related to performance efficiency, along with relationships with well-being, and social adjustment. It was then the notable work carried out by Marianne Frankenhaeuser and colleagues who found an increase of catecholamines in urine is a sensitive indicator of reactions to mental stress (Frankenhaeuser et al. 1961, 1962, 1968; Frankenhaeuser & Järpe, 1962). For example, Frankenhaeuser et al. (1962) repeatedly exposed participants to gravitational stress (human centrifuge) and took both self-report measures of distress and catecholamines (adrenaline & noradrenaline). They found that self-report distress and the levels of adrenaline excreted decreased during the trials. However, both heart rate and noradrenaline (which is important for blood pressure and homeostasis) remained elevated in all the trials. Moreover, the highest levels of adrenaline and noradrenaline were found on the first two trials suggesting the central role that the mental anticipation has on the stress response. In another study, Frankenhaeuser et al. (1968) found participants who had excreted high adrenaline and noradrenaline performed better in an audio visual conflict test than those with lower excretions. Furthermore, participants who had high excretion also reported low levels of stress and performed better on the task, whereas those who had low excretion reported higher stress and performed worse on the task. Therefore, these studies start to advocate a disparity between the psychology and

physiological reactions as the body displays signs of stress, yet the conscious mind does not. This relationship between the cognitive and physiological arousal can be seen in traditional theories of anxiety including, multidimensional anxiety theory (Martens, Burton, Vealey, Bump, & Smith, 1990) and catastrophe theory (Hardy, 1990), which suggest individuals can have high levels of one without the other. In other words, it is possible to experience high levels of cognitive anxiety with low levels of physiological arousal and vice versa.

It was also found that under stress the HPA axis could be activated which causes the secretion of adrenocorticotrophic hormone (ACTH) subsequently causing the release of cortisol. Cortisol is seen as the stress hormone, yet cortisol is regulatory in nature and cortisol's presence is required for normal autonomic function (Munck et al., 1984). For example, cortisol is essential for utilising stored glucose and fat (Lovallo, 2005). An early study by Ursin, Baade, and Levine (1978) looked at how Norwegian Army paratroopers responded to demanding situations. Blood and urine samples of catecholamine and cortisol were taken along with performance markers on several tasks. The findings revealed that the catecholamine was positively associated with better performance (written competence, and success in jumping), whereas cortisol was correlated with poor performance. These separate catecholamine and cortisol markers were also seen in United States Naval recruits who, as non-swimmers, were asked to jump into the deep end of a pool (Vaernes et al., 1982). Therefore, the research suggests that there are two systems, SAM activity which is associated with catecholamine excretion and better performance, and HPA activity, which is associated with cortisol excretion and poorer performance. This notion was further supported by Frankenhaeuser, Lundberg, and Forsman (1980) who found in response to achievement demands catecholamine output increases were met with decreases of cortisol output. More so, this dominance of SAM activity was linked to the mobilisation of effort on the choice reaction task and high level of personal control (self-paced stimulus rate).

A review by Dickerson and Kemeny (2004) found psychological stressors increased cortisol levels, but with varying levels depending on the type of stressor. For example, tasks that included social-evaluative stress, particularly when the outcome was uncontrollable, elicited a larger and more reliable cortisol change than other stressors (e.g., noise exposure, emotion induction tasks). As such, suggesting that stress is not one dimensional and somewhat going against Selye's early assumption of stress being a "non-specific" response. In other words, while the physiological networks involved in the stress response may be the same for both physical and psychological stress, the extent of their involvement can differ depending on how the stressor is perceived. This then echoes the idea of Lazarus' cognitive appraisal theory (Lazarus & Folkman, 1984). An individual who further distinguished the two emerging psychophysiological stress responses based on cognitive appraisal was Richard Dienstbier (1989).

Dienstbier's (1989) theory of arousal and physiological toughness provides further insight into the psychophysiological responses to stress. Drawing largely on the previous work surrounding cognitive appraisal theory (Lazarus & Folkman, 1984) and Scandinavian research, Dienstbier put forward the idea of challenge and threat responses based on the two divergent patterns to stressors seen in both the cognitive appraisal and the associated neuroendocrine activity. It was recognised that SAM activation was an adaptive response to stressors as seen by increases in blood flow and glucose levels along with associations of more positive emotions, whereas HPA (also referred to as PAC) activation was considered an inefficient response displaying weak physiological patterns and associated with more negative emotions. Further, it was proposed that the HPA activation accompanied by cortisol would be shown to dampen the effects of SAM rather than having direct effects on performance (Dienstbier, 1989).

Richard Dienstbier referred to this challenge response as ‘toughened arousal capability’ with both mental and physical coping consequences. With ‘toughening’, the energy needed to cope with the stressor is available and perceived to be easy and successful, accompanying with more positive physiological (arousal) outcomes. In addition, individuals who displayed a more ‘toughened’ response are more likely to enjoy challenging mental and physical activities and will seek these opportunities out (Dienstbier, 1989). There has been much support for Dienstbier’s theory and the role that cortisol and cognitive appraisals may have on the response to stressors alongside potential performance outcomes. For example, the review by Dickerson and Kemeny (2004) provided an extensive overview of the cortisol responses towards acute stressors and found substantial increases with those tasks that were uncontrollable and contained a social-evaluative threat. In addition, Harvey et al. (2010) found cognitive appraisals to be linked with cortisol levels in clinical simulations. More specifically those who appraised the scenarios as a threat were positively associated with increases in cortisol compared to those who appraised the situation as a challenge. Moreover, the higher the threat appraisal, the greater the cortisol levels. While this study did not examine any performance outcomes, previous researchers have found elevated cortisol to have performance impairments on memory, attention, decision making and clinical performance (e.g., Bohnen et al., 1990; Buchanan, Tranel, & Adolphs, 2006; Leblanc, 2009).

To summarize, the neuroendocrine response to stress has two separate pathways via the SAM response controlled by the hypothalamus and pituitary, and the HPA (PAC) response controlled by the sympathetic nervous system. Even in the absence of stress the role of these systems are crucial to homeostasis (i.e., energy mobilisation, maintenance of blood pressure) through endocrine feedback loops (Lovallo, 2005). The SAM response is largely referred to as the “fight-or-flight response” and associated with a release of catecholamines, whereas the HPA is responsible for releasing cortisol augmenting the cardiovascular response

to stress. As a result, increased SAM activity has been associated with positive emotion and better performance, whereas HPA activity has been associated with negative emotions and reduced performance. The role of cognitive appraisal (Lazarus & Folkman, 1984) has been shown to be pertinent to help explain the two pathways to the stress response, with challenge appraisals being link to SAM activity and threat appraisals being linked to HPA activity (Dienstbier, 1989). The next section explores theory that has combined psychology and physiology to create an interdisciplinary approach in understanding the human stress response.

## **Challenge and Threat States**

### **1.5 The Biopsychosocial Model (BPSM)**

Building on the work of Lazarus and Folkman (1984) and Dienstbier (1989), Blascovich and Tomaka (1996) developed the biopsychosocial model of arousal regulation (BPSM). The BPSM proposes that in motivated situations (e.g., sporting performance), individuals make two distinct cognitive appraisals: demand and resource appraisals. The demand appraisal refers to the demands, dangers, and uncertainties of the situation (e.g., fear of injury, losing, changing environments). The resource appraisal on the other hand, refers to perceptions of skills, knowledge, and abilities available for that situation (e.g., self-esteem and perceived control). As a result, these cognitive appraisals determine whether an individual evaluates a situation as a challenge or threat. A challenge state occurs when the perceived resources meet the perceived demands of the situation. In contrast, a threat state occurs when the perceived demands exceed the perceived resources. These challenge and threat states also encapsulate distinct patterns of physiological reactivity.

The BPSM theory of challenge and threat (Blascovich & Mendes, 2000; Blascovich & Tomaka, 1996) proposes two distinct physiological patterns within the sympathetic adrenal



medullary (SAM) and pituitary adrenal cortical (PAC). In a challenge state, an increase in SAM activation accompanied by catecholamine (epinephrine & norepinephrine) release occurs, causing changes from resting baseline (reactivity) in four cardiovascular variables. Specifically, an increase in heart rate (bpm), and cardiac output (CO), attenuated pre-ejection period (PEP), and decreased total peripheral resistance (TPR). Increases in HR and attenuation of PEP from baseline indicates motivation to engage in the task (e.g., Obrist, 1981). Therefore, a challenge response is representative of an efficient response to a stressful situation, whereby an increase in blood flow to the brain and muscles, higher blood glucose levels, and an increase in free fatty acids that can be used by muscles as fuel (e.g., Dienstbier, 1989, 1992).

In a threat state, SAM activity is also increased, however, it is accompanied by the increase in PAC activity. This causes a release of cortisol, and the PAC activity is thought to impact SAM activity by increasing or only stabilising TPR and CO (Dienstbier, 1989, 1992). Consequently, in a threat state, there are changes from resting baseline in four cardiovascular variables. There is still an increase in HR and an attenuation in PEP however, slight changes, stabilisation, or small decreases in CO, and an increase or stabilisation in TPR are seen. As a result, a threat response does not lead to an efficient energy delivery to the brain and muscles (Dienstbier, 1989, 1992). In other words, both challenge and threat states are determined by increased HR and PEP from resting baseline, which is indicative of a motivated performance. Then, a challenge state is seen to result in the efficient mobilisation of energy for action, through the increases in CO and decreases in TPR reactivity. Whereas a threat state is proposed to result in a less efficient mobilisation of energy for action, through a stable or a decreased CO and increased TPR reactivity (Blascovich & Mendes, 2000).

It is possible to look at earlier studies for the validation of the BPSM and its proposed cardiovascular responses in response to cognitive appraisal. For example, Tomaka et al.

(1993) found that cognitive appraisals predicted both subjective and physiological reactions to a mental arithmetic task (i.e. a motivated performance situation). In a series of experiments, they found that threat appraisals were associated with high subjective stress, reduced effort, and performance in a mental arithmetic task, when compared with challenge appraisals. Further, challenge appraisals were associated with increased CVR (HR, PEP, and CO) and decrease TPR, when compared with threat appraisals. The results from these initial studies show support for the ideas postulated in the BPSM model that challenge appraisals lead to more adaptive physiological responses, while threat appraisals lead to maladaptive physiological responses towards a motivated performance situation. Furthermore, these studies demonstrate that both subjective (i.e., self-report) and objective (i.e., CV variables) can be measured in line with challenge and threat appraisals relative to motivated performance situations.

However, the BPSM has received some criticism from other researchers, most notably coming from Wright and Kirby (2003). The authors stated that the conception of demand and motivated (goal-relevant) situations are unclear within the BPSM. In addition, they put forward issues with the determinants of challenge and threat, arguing that the demand appraisals (effort, uncertainty, danger) cannot be matched with the resource appraisals. For example, they suggested that both uncertainty and danger are conceptually disassociated with performance resources, and therefore cannot be compared to them. While required effort is conceptually related to performance resources and can be compared to the resources. Lastly, Wright and Kirby (2003) present issues with the CV predictions, stating that the CV predictions are not well founded. This criticism was then later addressed by Blascovich et al. (2003) who argued against the criticism of Wright and Kirby (2003) by stating that their criticisms were based on misunderstandings of the theory and data. Nevertheless, it was clear that future research was needed to fully understand the CV predictions inferred by the BPSM.

Since the inception of the BPSM there has been a wealth of research utilising this framework for explaining the determinants and responses to stress. An outline of this research is seen later in the thesis (Section 1.7). However, it is worth outlining at this point that the research has also led to the expansion of the BPSM with research and theory specifically focused on expanding theory of challenge and threat and subsequent outcomes.

### **1.6 The Theory of Challenge and Threat States in Athletes (TCTSA)**

The Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009) suggests, like the BPSM, that how an individual responds in a motivated performance situation is determined by their appraisals of situational demands and resources. Moreover, the TCTSA brings together various theories of stress and emotion to put forth a more comprehensive theory of challenge and threat. The TCTSA is predominantly an amalgamation of the BPSM of challenge and threat (Blascovich & Mendes, 2000), the model of adaptive approaches to competition (Skinner & Brewer, 2004), and the debilitating and facilitative competitive state anxiety model (Jones, 1995). Both the TCTSA and the BPSM however, suggest that challenge and threat states have two distinct psychophysiological responses to stressors. A challenge state is considered to be an adaptive approach to a motivated situation, in which personal resources meet or exceed perceived situational demands. Whereas, a threat state is considered a maladaptive approach to a motivated situation, in which personal resources do not meet perceived situational demands (Blascovich & Mendes, 2000). In Skinner and Brewer's (2004) model of adaptive approaches to competition, challenge and threat appraisals differ somewhat to those proposed in both the BPSM and TCTSA. For example, a challenge appraisal is determined by opportunities for success, mastery, learning and personal growth, which suggests that with confidence the demands of the situation can be met. However, a threat appraisal is determined by potential and expected danger to one's well-being or self-esteem, along with low confidence in being

able to cope with the threat (Jones et al., 2009). In relation to an athlete's emotions before a performance, the TCTSA considers the concept from the debilitating and facilitative competitive state anxiety model (Jones, 1995). This model states that athletes can interpret emotional responses relating to an upcoming competition as either helpful or unhelpful. Further, those that perceive their anxiety symptoms as helpful for performance report more positive feelings (e.g., excited, relaxed) and less negative feelings (e.g., tense, angry) compared with those who perceive their anxiety symptoms as unhelpful for performance (Mellalieu, Hanton, & Jones, 2003). The next section will cover the TCTSA in more detail to provide a greater understanding of how it was developed.

### **1.6.1 The Development of the TCTSA**

#### **1.6.2 Demand and Resource Appraisals**

In the BPSM, cognitive appraisal is a key component and consists of both demand and resource appraisals (Blascovich & Mendes, 2000). The demand appraisals include perception of danger, uncertainty, and effort required. An example of where demand appraisals would be made in sport, is if a rugby player perceives their opponent as physically stronger (danger of injury and self-esteem), is also unsure of how they may perform (uncertainty) and believes it will take a great deal of physical and mental effort to succeed (effort). All three of these demand appraisals are included in the TCTSA. The resource appraisals outlined in the BPSM are related to how a person copes with the demands, and includes skills, knowledge, abilities, and dispositional factors (e.g., self-esteem, & sense of control). For example, a badminton player may be in a challenge state if they have recently been playing well (experience and skills) and is competing against an opponent whom they have beaten in the past (knowledge). The resource appraisals outlined within the TCTSA were formulated from those within the BPSM, with influences from the model of adaptive approaches to competition (Skinner & Brewer, 2004), and the model of debilitating and

facilitative competitive state anxiety (Jones, 1995). The TCTSA extended the BPSM by outlining three inter-related resource appraisals, self-efficacy, control and perceptions of approach goals.

Self-efficacy beliefs are judgements of what an individual can accomplish with his or her skills (Bandura, 1986). Self-efficacy is seen vital in all three models mentioned above, and is one of the most influential psychological constructs thought to affect achievement in sport and performance (Feltz, 1988). Bandura (1986) outlined four sources of self-efficacy; performance accomplishments, vicarious experience, verbal persuasion, and psychological states. Jones et al., (2009) states that self-efficacy is an important aspect of the resource appraisals because it elicits the perception that an individual can cope with the given demands of the situation. Furthermore, self-efficacy is also closely linked with perceived control because an individual needs to believe they are in control to carry out the required actions, in order to improve self-efficacy (Bandura, 1997).

Perceptions of control are key to the model of debilitating and facilitative competitive state anxiety (Jones, 1995) and is mentioned as a dispositional factor within the BPSM. Control can be seen to have three core elements; objective control, perceived control, and experiences of control (Skinner, 1996). Objective control refers to the actual control present in the situation and the individual. Perceived control refers to the beliefs the individual has about how much control is available. Lastly, experiences of control refer to the feelings of the individual in the situation influenced by external conditions, subjective interpretations, and individual actions. Perceived control is considered the most powerful predictor of functioning out of all three (Skinner, 1996). When an individual focuses on uncontrollable aspects, this is likely to result in a threat state. However, if an individual focuses on aspects they can control, this is likely to result in a challenge state (Jones et al., 2009).

The importance of goal orientation is also outlined in the model of adaptive approaches to competition (Skinner & Brewer, 2004). Goals can play an important part in athletes' responses to a sporting situation, and central to this is the achievement goal theory (Roberts et al., 2007). According to this theory, there are two distinct types of goals: mastery and performance goals. Mastery goals focus on developing competence through mastering tasks and develop task involvement. Performance goals however, focus on demonstrating competence relative to others and develop ego involvement (Dweck, 1986). The TCTSA adopts the 2x2 achievement goal framework that consists of mastery and performance goals associated with either goal approach or goal avoidance (Elliot & McGregor, 2001). In their framework, approach goals reflect striving for competence and consists of both performance approach (PAp) and mastery approach (MAp). PAp goals reflect the motivation to be seen as more competent than the other person, whereas MAp goals reflect a motivation to appear competent in relation to a self-referenced target. On the other hand, avoidance goals reflect a drive to avoid incompetence and consists of both performance avoidance (PAv) and mastery avoidance (MAv). PAv goals reflect a motivation not to be regarded more incompetent than another person, whereas MAv reflects a motivation to avoid incompetence in relation to a self-referenced target.

In relation to challenge and threat states, Elliot and McGregor (2001) found students who held mastery and PAp goals tended to perceive an upcoming exam as a challenge, while students who held PAv goals tended to perceive the exam as a threat. Furthermore, Adie, Duda, and Ntoumanis (2008) found that on approach to a sporting competition, MAp goals were positively related with challenge appraisals, and MAv goals were a strong predictor of threat appraisals. However, PAp goals related positively to both challenge and threat appraisals, but related stronger to threat appraisals. Finally, PAv goals did not predict threat appraisals of sport competition. In another study, Chalabaev et al. (2009) explored CVR in

relation to PAp and PAv goals. Participants were split into two instructional performance groups: exceptionally strong performers (PAp) and exceptionally weak (PAv). The results showed participants in the PAp group performed better on the problem-solving task, displayed a CV pattern indicative of a challenge, and reported higher feeling of challenge than the PAv group. Participants in the PAv group displayed a CV pattern indicative of a threat state, however, did not report higher feelings of threat. This discrepancy between CVR and self-reported measures of challenge states may support the idea that indirect measures may be a more effective way of assessing these states, due to potential unconscious mechanisms (Blascovich & Mendes, 2000; Blascovich et al., 2004). In summary, research has shown that individuals with approach goals will tend to view and display CVR to an upcoming situation as a challenge, while those with avoidance goals will tend to view and display CVR to an upcoming situation as a threat.

Overall, the TCTSA suggests that high levels of self-efficacy, perceived control, and a focus on approach goals, signify sufficient resource appraisals on approach to a motivated performance situation, which is indicative of a challenge state. Conversely, low levels of self-efficacy, perceived control, and a focus on avoidance goals, signify insufficient resource appraisals on approach to a motivated performance situation, which is indicative of a threat state. Measuring both demand and resource appraisals in research often relies on self-report methods. However as mentioned earlier, demand and resource evaluations may not happen on a conscious level, raising concern for the accuracy of self-report challenge and threat measures (Blascovich & Mendes, 2000). In addition, individual responses may be prone to social desirability (Jones et al., 2009). Therefore, measuring challenge and threat via cardiovascular indices similar to the BPSM may have additional benefits. The following section will highlight the physiological and emotional components of the TCTSA.

### 1.6.3 Physiological and Emotional Components of the TCTSA

The TCTSA incorporates the same physiological responses to those outlined in the BPSM, with the addition of proposed performance consequences and outcomes in relation to sport. Therefore, an increased SAM activity and accompanying increases in epinephrine and cardiac activity (HR, CO) along with a decrease in TPR, is indicative of a challenge state. As a result, a challenge state leads to an efficient response (i.e., delivery of energy), which is likely to lead to successful sports performance outcomes (Jones et al., 2009).

While an increase in both SAM and PAC activity along with accompanying increases in cortisol, smaller increases in cardiac activity and either no change or an increase in TPR, is indicative of a threat state. As a result, a threat state leads to an inefficient response, which is likely to lead to unsuccessful sports performance outcomes (Jones et al., 2009). Along with the physiological responses outlined above, the TCTSA also outlines emotional states associated with performance.

Both the BPSM (Blascovich & Mendes, 2000) and the model of adaptive behaviours (Skinner & Brewer, 2004) suggest that those in a challenge state will have a more positive affect than those in a threat state. Furthermore, a challenge appraisal leading to positive emotions are more likely to be perceived as helpful to performance. Whereas a threat appraisal leading to negative emotions are more likely to be perceived as harmful to performance (Skinner & Brewer, 2004). Similarly, Lazarus (1991) also reported that those perceiving a situation as a threat leads to high levels of anxiety and unhelpful emotions, while perceiving a situation as a challenge results in more positive emotions (e.g., joy, happiness). Equally, the TCTSA also proposes that a challenge response will be associated with positive emotions and the perception of these being more helpful for performance, whereas a threat state will be associated with higher negative emotions (e.g., frustration, anger) and the perception of these as unhelpful for performance.



The impact of anxiety on performance, whether helpful or unhelpful, is believed to be dependent on the accompanying cognitions (Jones et al., 2009). For example, when an individual is anxious, the cognitive resources available for a task may be limited (Janelle, 2002), and attention is directed away from the relevant task (Eysenck et al., 2007). The TCTSA posits that in a challenge state, the focus of attention is directed to task relevant cues. Whereas on the other hand, focus of attention is directed towards task irrelevant cues in a threat state. Therefore, in relation to cognitive performance, a challenge state is more desirable.

To conclude, the TCTSA provides a more detailed and contemporary explanation of why athletes may perceive an upcoming competition as either a challenge or a threat. In addition, it explains how they can respond emotionally and physiologically, and how these differing states can ultimately influence performance outcomes. It is worth noting that the TCTSA is not just relevant to athletes but to all human beings within a performance context. Since the formulation of the BPSM and TCTSA, a plethora of research has utilised the challenge and threat framework for understanding stress and the accompanying responses. The next section of this review will explore some of the research that has been conducted in the various domains.

## **1.7 Research Studies on Challenge and Threat**

### **1.7.1 Individual Differences**

There are several areas within individual differences that have been of interest for researchers with a particular focus on adopting the BPSM as the framework. Examples of these include world beliefs, assertiveness, personality, self-esteem, defensive pessimism, and basic psychological needs.

Just world beliefs (e.g., a person's actions are inclined to bring fair consequences) has been explored in relation to BPSM of stress (Tomaka & Blascovich, 1994). It was found that individuals high in just world beliefs had more helpful cognitive appraisals, displayed CVR indicative of a challenge state, and performed better on an arithmetic task than those individuals with low just world beliefs. In another study, assertiveness was explored as a moderator of stress among women (Tomaka et al., 1999). It was found that high assertive women cognitively appraised the stressful task (an impromptu speech) as challenging, compared with low assertive women who appraised the task as threatening. Furthermore, the high assertive women displayed CV patterns indicative of a challenge response (maintained CO and lower TPR) than low assertive women, who displayed CV patterns indicative of a threat response (lower CO and an increased TPR). High assertive women also revealed having experienced less stress and higher positive emotion than the low assertive women. In summary, assertive women reported more adaptive responses to the stressful task compared to the low assertive women.

Personality has been shown to influence challenge and threat appraisals (Allen, Frings, & Hunter, 2012; Gallagher, 1990; Mak, Blewitt, & Heaven, 2004; Schneider, 2004). For example, both Gallagher (1990) and Mak et al. (2004) found that students displaying higher levels of extraversion were more likely to exhibit responses in line with a challenge response, whereas those students displaying higher levels of neuroticism were more likely to exhibit responses in line with a threat. However, these studies did not measure the wider personality traits (e.g., openness, agreeableness, and conscientiousness) or did not measure the CVR indices of challenge and threat. In contrast, Allen et al., (2012) had athletes imagine either an upcoming competition (experimental condition) or the events that happened that morning (control condition) while cardiovascular responses were being measured. In addition, self-report personality and coping questions were also taken. The results from the

study revealed associations between lower CO and higher TPR (threat response) with more problem and emotion-focused coping and higher levels of extraversion and conscientiousness. However, no differences were found between the sport-specific speech and the control condition. Therefore, the research suggests that personality can have an influence of both cognitive appraisals and CVR in line with challenge and threat states.

Self-esteem has also been examined by adopting the challenge and threat theory. A study by Seery et al. (2004) found that participants given failure feedback (e.g., negative and non-encouraging) to those with unstable high self-esteem and those with stable low self-esteem displayed cardiovascular responses indicative of a threat towards a word association task (Remote Associates Test; RAT). On the other hand, after success feedback (e.g., positive and encouraging), participants with unstable high self-esteem displayed cardiovascular responses indicative of a challenge. It was concluded that individuals with unstable self-esteem possess underlying self-doubt, which could be demonstrated via the BPSM of challenge and threat. The RAT was also used in another study looking at individual dispositions of defensive pessimism (Seery et al., 2008). The results revealed that defensive pessimists exhibited the greatest threat response in the negative imagery condition and adopted a more conservative test-taking strategy than those in positive and relaxation imagery conditions. In other words, defensive pessimists were less likely to guess when under threat and more likely to answer correctly. The implication of these findings could suggest that negative reflection may encourage defensive pessimists into task preparation (e.g., an exam) allowing for a higher chance of greater performance. Therefore, suggesting on some occasions a threat response may perhaps be beneficial in certain domains. More recently, Shin et al. (2020) explored the effects of challenge and threat and feedback types on feedback acceptance and motivation. Students who reported challenge appraisal demonstrated the greatest feedback acceptance after receiving positive task-oriented feedback on an essay,

whereas those who reported threat appraisal demonstrated the greatest feedback acceptance after receiving negative task-oriented feedback. In addition, those reporting challenge appraisals were the most motivated to engage in more challenging tasks after receiving both positive and negative feedback. These results highlight the role that challenge and threat can play in how students respond to feedback and how this then influences motivation.

Research by Quested et al. (2011) looked at the role of basic psychological needs satisfaction (e.g., autonomy, competence and relatedness; Deci & Ryan, 2000) in a dancer's cognitive appraisals, cortisol and emotional responses to stress (a performance in front of judges). The results from the study revealed that high basic psychological needs satisfaction was related to lower cortisol responses, lower anxiety intensity, higher challenge appraisal along with lower threat appraisals when compared with low basic psychological needs satisfaction. As a result, having higher basic psychological needs satisfaction when approaching a stressful event predicts more helpful physiological and emotional reactions which is indicated by a challenge response. Building from this, Bartholomew et al. (2017) looked specifically at how appraisal of organisational stressors can predict satisfaction and frustration of basic psychological needs. It was reported that the frequency, intensity, and duration of organizational demands were related to both challenge and threat appraisals, which was associated with basic psychology needs. In addition, challenge and threat appraisals predicted feelings of need satisfaction and frustration. For example, frustration was more related to threat, whereas need satisfaction was better predicted by challenge appraisals.

In summary, there have been several studies examining how individual differences can relate to challenge and threat appraisals. A particular area that has, and is continuing to receive attention from researchers, is how challenge and threat states can predict subsequent performance.

### 1.7.2 Performance

Two recent reviews identified studies that have used challenge and threat to predict performance outcomes (Behnke & Kaczmarek, 2018; Hase et al., 2018). Findings have generally shown to support the idea that a challenge state leads to a better performance than a threat state (e.g., Blascovich et al., 2004; Mendes et al., 2007; Seery et al., 2010; Turner et al., 2012). These task performances derive from a range of different contexts. For example, problem solving (Chalabaev et al., 2009), mental arithmetic (Kelsey et al., 2000; Quigley et al., 2002; Tomaka et al., 1997; Tomaka et al., 1994), academic achievement (Seery et al., 2010), computer car racing game (Trotman et al., 2018), and sporting performance (Blascovich et al., 2004). Nevertheless, often the performance outcomes in some studies are not considered as important as some of the psychological variables by researchers. This is demonstrated by the lack of hypotheses concerned with task performance and the reporting of the performance results (e.g., Quigley et al., 2002; Seery, Weisbuch, & Blascovich, 2009; Tomaka et al., 1994). Furthermore, those studies that do recognise and report performance outcomes do not always state performance is correlated to CVR (Scheepers, 2009; Tomaka et al., 1997; Trotman et al., 2018).

Research has specifically examined the association between CVR and performance and Behnke and Kaczmarek (2018) review identifies 19 studies. For example, in Blascovich et al. (2004) study, both college baseball and softball players imagined and gave a speech about a certain playing situation, while cardiovascular data was being recorded. Those that displayed a challenge response to the task performed better in terms of their athletic performance for the rest of the season, relative to those that displayed a threat response to the task. However, the study contained a relatively small sample and relied on the participants imagery ability. In another study, Seery et al. (2010) provides a similar illustration in an academic context. They found that individuals who exhibited cardiovascular markers

indicative of a challenge state while discussing academic interest, performed better in the subsequent course than those who displayed a threat response. These findings were still apparent, even after accounting for two other important predictors of academic performance (entrance exam score and academic self-efficacy). Again however, a limitation was that imagining a situation is very different to approaching an actual situation thus lacking ecological validity. In sum, both these studies suggest that CVR was able to predict longitudinal performance in both sporting and academic performance. Although, to support both these studies, subsequent CVR recording would need to be obtained prior to succeeding performances over the year to validate such claims.

More recent research has addressed some of the limitations mentioned above. For example, Moore et al. (2012) explored motor task performance directly after CVR data was collected. By using instructional sets, participants allocated participants to either challenge or threat conditions before performing a golf-putting task. The results from the study supported the BPSM and showed those in the challenge condition displayed CVR and challenge appraisals greater than those in the threat condition. In addition, the challenge group who performed more accurately on the golf putting task, reported more favourable emotions, and displayed more effective gaze, putting kinematics, and muscular activity, than those in the threat group. Similar findings were also found for experienced golfers (Moore et al., 2013). The results from these studies suggest that the kinematic variables may be a potential mechanism for the relationship between challenge and threat CVR and motor performance. In another set of studies, Turner et al. (2012) looked at the predictive factors of challenge and threat states on performance, on both a Stroop task and a netball shooting task. Results concluded that those that displayed CVR indicative of a challenge response predicted a superior performance in both tasks compared with those indicative of a threat response. These

findings show support for the theory that CVR indicators of a challenge state should lead to a better performance for both competitive cognitive and motor tasks.

Not all studies have found challenge to predict better performance with some showing non-significant findings or contradictory findings (Studies 1 & 4: Feinberg & Aiello, 2010; Laborde, Lautenbach, & Allen, 2015). In addition, Turner et al. (2013) explored challenge and threat responses on approach to a batting task in elite cricketers. They found that those who displayed CVR indicative of a challenge response predicted superior batting performance compared to those who displayed a threat response. Interestingly, there were several participants who displayed threat response but performed well (they also reported high self-efficacy). In addition, there were several participants who displayed a challenge response but performed poorly (they also reported higher avoidance goals). This suggests some caveats to the challenge and threat performance relationship echoing similar concerns to Uphill et al. (2019) around drawbacks in measurement and the consideration of whether challenge and threat should be on a single bipolar continuum. To this end, researchers have also attempted to manipulate cognitive appraisals to be able to better understand challenge and threat states.

### **1.7.3 Challenge and Threat Manipulations**

Instructional sets have been successfully used to try and manipulate challenge and threat responses (e.g., Feinberg & Aiello, 2010; Hemenover & Dienstbier, 1996; Taylor & Scogin, 1992; Tomaka et al. 1997). These instructions have predominantly been based around either altering perceived task demands of the upcoming task, or by altering perceived task importance and resources (e.g., Tomaka et al., 1997). This is linked to the demand appraisals as seen in the BPSM of challenge and threat (Blascovich & Mendes, 2000). For example, Feinberg and Aiello (2010) had participants carry out a mental arithmetic task after given either challenge or threat instructions. The instructions were emphasised fundamentally

around task demands with challenge instructions including things such as “think of yourself as someone capable of meeting the challenges of the task”, whereas threat instructions included “many participants have trouble performing well on this task” (p. 2104). The results from the study showed that those given the challenge instructions performed significantly better than those given the threat instructions. Thus, providing supporting evidence for the BPSM and TCTSA. Although not all the studies manipulating challenge and threat using instructional sets have measured CVR. However, the study by Tomaka et al. (1997) looked at CVR and found that participants given challenge instructions displayed challenge CVR and cognitively appraised the mental arithmetic task as challenging. Whereas participants given threat instructions displayed threat CVR and cognitively appraised the task as threatening. However, these studies have often been confined to a laboratory setting and as such, it is unclear whether trying to manipulate perceived task demands would reveal the same results in an actual motivated situation (Turner et al., 2014).

Research has also used psychological skills such as imagery (e.g., Williams & Cumming, 2012; Williams et al., 2010, 2017) and cognitive reappraisal (e.g., Beltzer et al., 2014; Jamieson et al., 2010, 2012, 2018) to manipulate challenge and threat states. For example, challenge and threat imagery has been used to manipulate cognitive appraisals and CVR. A study by Williams et al. (2010) found that participants receiving challenge imagery (highlighting coping resources meeting the demands of the situation) led to reduced threat appraisals, more positive emotions, and higher confidence. This was opposed to participants receiving threat imagery (highlighting resources not meeting the demands of the situation), which led to more threat appraisals, negative emotions, and lower confidence. The results from CVR data however showed no differences between the imagery conditions.

Reappraisal has also been used to try and manipulate challenge and threat states in line with the BPSM. An example comes from Jamieson et al. (2010) who found that



participants assigned the reappraisal condition (anxiety improves performance on upcoming task) demonstrated higher catecholamine levels, and performed better in the subsequent exam than those in a control condition. In a similar study, participants assigned to the reappraisal condition displayed elevated CO and lower TPR reactivity than those participants in the other conditions (Jamieson et al., 2012). Thus, suggesting that reappraisal leads to a more adaptive physiological response. Arousal reappraisal has also been manipulated on approach to a pressurised golf putting task. Results revealed that the reappraisal group elicited cardiovascular responses indicative of a challenge state and performed better on the task compared with the control group (Moore et al. 2015). Similarly, Sammy et al. (2017) found that participants assigned to an arousal reappraisal group reported greater resource appraisals (including self-confidence) and displayed more adaptive CVR than those in the control group. Though no performance or attention differences were found in the dart throwing task. More recently, the effect of facial expression (i.e., smiling) were examined in line with challenge and threat theory. Chu et al. (2019) primed participants with either an emotion regulation strategy (reappraisal) or no emotion regulation strategy (control) while their opponent either displayed an amused smile or a polite smile after the results of a dilemma task. Results showed that those in the no regulation condition were less likely to cooperate when their opponent displayed an offensive and amused smile compared to if they displayed a polite smile. These findings were also reflected in CVR responses, revealing that those in the control group exhibited CVR responses indicative of a challenge state, whereas those in the reappraisal exhibited a threat state. As such, showing an opposite finding to that of previous research. The authors do note caution when interpreting these findings and suggest further work is needed to understand the complexity of reappraisal on CVR responses. Nevertheless, this study adds to the literature by demonstrating how non-verbal interaction

with others can influence reappraisal. Collectively, these studies do offer empirical support for reappraisal being a useful method for manipulating challenge and threat states.

Self-distancing has been manipulated to test its effects on challenge and threat CVR responses (Streamer et al., 2017). The study by Streamer et al. found that participants who self-distanced (using non-first-person pronouns and their own name) while preparing for a speech task displayed CVR responses in line with greater challenge than those who used first-person pronouns. Similar results were also found in a subsequent speech task on an unrelated topic. The results from this study suggest that self-distancing could lead to more helpful responses towards pressured situations.

More recently, a brief best possible selves intervention has been used to examine the effect on CVR responses of challenge and threat in trait anxious individuals (Schwerdtfeger et al., 2020). Participants were either assigned to the best possible selves' group or an active control group prior to a sing a song stress task. Results revealed that trait anxiety were related to greater CO in the best possible selves' group and lower CO and greater TPR in the control group. Further, greater positive affect was associated with those in the intervention group compared with the control. This suggests that the intervention which focusses on strengths and positive assets before a stressful situation could elicit a more adaptive response in trait anxious individuals.

Overall, evidence has shown that it is possible to alter challenge and threat states by using instructional sets, psychological skills such as imagery and reappraisal, and self-distancing. To this end, providing further support for the role of cognitive appraisal in mediating the stress response and demonstrating how changing perception can determine differing coping responses.

#### 1.7.4 Summary of Challenge and Threat States

The BPSM and TCTSA both offer a useful framework to help understand how individuals respond to stressors, or motivated performance situations. Through perceived demand and resource appraisals, along with CVR, the BPSM and TCTSA posit two distinct patterns: challenge and threat states. A challenge state is associated with increases in epinephrine and norepinephrine (as opposed to a release in cortisol, as seen in a threat state). As a result, both cardiovascular and neuroendocrine responses indicate a challenge state being a more adaptive approach to a motivated performance situation, providing a more efficient response than a threat state. Research has shown that a challenge state is related to superior performance compared to a threat when approaching a motivated performance situation (see Behnke & Kaczmarek, 2018; Blascovich et al., 2011; Hase et al., 2018; Seery, 2011 for reviews).

Nevertheless, there are some important considerations when looking at research concerning challenge and threat. First, while the research has suggested that both the cognitive evaluations (demand and resources) and the CVR indices are predictive of performance, it is still unclear which is most important (Hase et al., 2018). Furthermore, within this body of research there has been some variation in the measurements used to evaluate challenge and threat states. For example, some have used self-report measures of the demand and resource appraisals (e.g., Gildea, Schneider, & Shebilske, 2007), while others have used physiological indices (e.g., Blascovich et al., 2004), and some have measured both (e.g., Tomaka et al., 1993). Therefore, it is perhaps worth noting again that cognitive appraisals happens at an unconscious level (e.g., Blascovich & Mendes, 2000; Blascovich et al., 2004). Consequently, raising issues with self-report measures of cognitive appraisals as these measures may not be sensitive enough in capturing the non-conscious evaluations. This can be supported by Weisbuch-Remington et al. (2005) who found that positive religious

symbols presented to participants outside their conscious awareness predicted subsequent challenge CVR compared to those who were shown negative religious symbols outside their conscious awareness, which predicted subsequent threat CVR before delivering a speech about their own death. This study demonstrates that despite the participants being unable to recall or report the symbols presented in the study, they still elicited CVR indicating challenge and threat responses. Further, discrepancies have been found between self-report and physiological measures (e.g., Turner et al., 2012). Nonetheless, the challenge and threat framework has been widely supported in the literature and it has been used to explain how individuals respond to various motivated performance situations.

Much of the literature discussed so far has focused on individual differences and personal factors (e.g., perceptions of control, self-efficacy, personality etc) on approach to stressful situations (i.e., motivated performance situations). Nevertheless, as Aristotle stated, “Man is by nature a social animal; an individual who is unsocial naturally, and not accidentally is either beneath our notice or more than human” (Aristotle, 350BC), meaning that humans are social beings and often belong in groups (e.g., sporting, workplace, religious). Therefore, if our interaction with the environment has an influence on the stress response (Lazarus & Folkman, 1984), then it may be important to consider some of the social factors that may be involved in this process. While previous models (e.g., the appraisal theory) view the individual as engrained in the social environment, little attention and understanding on the mechanisms involved have been provided. For example, Lazarus (1999) acknowledged emotional outcomes were reflected in the person-environment relationship, broadly noting that emotions are a result of how human relationships are appraised. It was also outlined that the four broad environmental factors, demands, constraints, opportunities, and culture were influential in the appraisal process. Nevertheless, currently very little research has explored the social elements, and a systematic review conducted by Kerdijk, van

der Kamp, and Polman, (2016) found no studies examining the role of the social context and in particular the role of significant other persons on the stress and coping process. Folkman and Moskowitz (2004) also noted that the literature on stress and coping is dominated by individualistic approaches which has neglected the social aspects. Though, an emerging body of studies have explored some of the social factors that could influence challenge and threat states which will be reviewed next.

### **1.7.5 Social Influences**

Scholars have explored the influence of social contexts on the stress response, specifically how these contexts can predict how individuals may respond in motivated performance situations. Social facilitation for example, has been examined in line with the BPSM of challenge and threat (Blascovich et al., 1999). To illustrate, Blascovich et al asked participants to perform either a well-learned task or an unlearned task either alone or with an audience while CVR responses were being measured. The results showed that those who performed a well-learned task in front of the audience displayed CVR responses indicative of a challenge response (increased CO and decreased TPR), compared to those who performed an unlearned task in front of an audience, who displayed CVR responses indicative of a threat response (decreased CO and increased TPR). There were also no significant differences in CVR from baseline for those performing either the learned or unlearned task alone. Furthermore, participants in the presence of others (audience) were also more likely to achieve a perfect score on the well-learned task compared to those performing alone, providing support for the social facilitation theory.

The use of CVR indices to assess threats in inter-group contexts has also been explored in research (Blascovich, Mendes, et al., 2001; Blascovich, Spencer, et al., 2001; Mendes et al., 2002; Mendes & Koslov, 2013). For example, Blascovich, et al. (2001) carried out three studies looking at the stigma-threat hypotheses. Results from the first two studies

showed that individuals interacting with stigmatized partners (e.g., race, socioeconomic status), displayed CVR indicative with a threat response and had poorer performances, than those who interacted with non-stigmatized partners, who exhibited challenge reactivity. Furthermore, Mendes et al. (2007) found that participants interacting with expectancy violating partners (e.g., Asians with southern accents) displayed CVR consistent with threat, performed worse on a word finding task, and rated their partners more negatively, compared to those paired with expectancy partners (e.g., Asians with local accents).

In another study, Mendes, et al. (2001) looked at social comparisons and found that participants making upward comparisons (e.g., told they performed worse than their experimental partner) evaluated being threatened (demands outweighed resources) and displayed CVR in line with a threat state in a word finding task. On the other hand, participants making downward comparisons (e.g., told they performed better than their experimental partner) were more challenged (resources outweighed demands) and displayed CVR in line with a challenge state in a word finding task. The effect of gender stereotype on challenge and threat states has also been explored by using a math test described as either gender-biased (gender differences in performance) or gender-fair (not showing gender differences in performance). Results showed women in the gender-biased condition displayed a CVR response indicative of a threat, whereas the opposite was seen for men, as they displayed a CVR response indicative of a challenge when a gender-bias was implied but displayed a CVR response indicative of a threat when it was not (Vick et al., 2008).

Social acceptance and rejection have been explored within interracial contexts. For example, Mendes et al. (2008) found that social rejection (e.g., receiving negative evaluation) in an interracial context led to CVR indicative of a challenge, better performance in a word finding task, and higher self-reported and non-verbal displays of anger. Conversely, rejection in an interracial context led to CVR indicative of a threat, and worse performance in a word

finding task. However, no significant negative emotions were found. Furthermore, interracial social acceptance (receiving positive feedback) led to CVR responses indicative of a challenge, higher performance, and increased positive emotions than those receiving positive evaluation from an interracial partner (for white participants only). On the other hand, black participants displayed CVR responses in line with a threat, performed worse, and exhibited less positive emotion when positively evaluated by white partners. The results from this study show how the racial context can elicit differences in CVR, emotional, and behavioural responses of individuals.

Variations in CVR has also been found across gender. For example, in a series of studies Mendes et al. (2003) found that in gender matched dyads, the emotional condition (participants asked to talk about their deep thoughts and feelings) displayed challenge CVR, whereas the emotional suppression condition (participants told to delay their thoughts and feelings until a later in the experiment) displayed threat CVR. In contrast, the emotional condition within opposite-sex dyads elicited threat CVR.

A study from Zanstra, Johnston, and Rasbash, (2010) examined CVR in a real life situation, within a student classroom presentation. Results revealed in the anticipation phase, increased challenge appraisal were associated with decreased TPR and increased CO, with increased threat appraisal associated with increased TPR and decreased CO. This provides further support for the challenge and threat theory within a natural setting. In addition, these findings only emerged during the anticipation phase of the study compared with during the actual stressor, therefore validating the common procedure within challenge and threat research of measuring CVR in the preparation period of the task. However, the exact mechanisms involved as well as any group influence was not measured within the study. Therefore, it is hard to ascertain whether the group setting would have impacted on the participants appraisals and CVR.

In summary, there has been several studies exploring the influence that certain social contexts can have on an individual's responses in terms of CVR and task performance in line with the challenge and threat theory. Although, these studies appear to be disparate and there is no concerted theoretical approach that encapsulates the social aspects. Social psychologists have been exploring the various social aspects linked with stress and coping, with one main resource identified as social support (Pearlin et al., 1981). Specifically, research that has examined social support, has shown it to play a pivotal role within the stress response. The next section will outline and provide an overview of social support and stress.

### **1.8 Social Support and Stress**

“No man is an island” (John Donne, 1975)

The above quote from English poet John Donne emphasises the idea that human beings need to be part of a group or community and do poorly when isolated from others. This notion is also expressed in the idea that humans have an internal drive for a need to belong (Baumeister & Leary, 1995). Seminal work by Durkheim (1897/1951) highlighted the importance of social conditions and suicide, in that individuals with greater social connections were less likely to commit suicide. One of the main reasons for this is humans need to feel connected and to access various support from others, which is often referred to as ‘social support’. Social support has been defined in a number of different ways however, early work from Cobb (1976) stated that social support comes in different types. Cobb, (1976) described social support as information that makes an individual feel they are 1) “cared for and loved” 2) “esteemed and valued”, or 3) “part of network of communication and mutual obligation” (p. 300). It was then that House (1981) outlined social support as the functional content of relationships that can be determined by four broad categories of supportive behaviours or acts. These include emotional support (i.e., empathy), instrumental or tangible support, (i.e., provision of material aid) and appraisal support (i.e., provision of



information that is useful for self-evaluation). Since then, there have been a number of variations of the type of social support, however Cutrona and Russell (1990) outlined the four which has received most agreement as being emotional, esteem, informational, and tangible support. A more recent definition of social support comes from Thoits (2010) who stated social support as “emotional, informational, or practical assistance from significant others, such as family members, friends, or co-workers; (and that) support actually may be received from others or simply perceived to be available when needed” (p. 46). Social support can also be regarded as verbal or non-verbal (i.e., nodding, smiling, eye contact) and separated into perceived and received categories. Perceived support refers to a person’s potential access to supportive resources, and is independent of the actual reception of support (Cohen & Wills, 1985). Whereas, received support refers to actual support that a person receives (Haber et al., 2007; Helgeson, 1993). In the literature the receipt of support has been termed many names, including received support, enacted support, or actual support. Research has shown that perceived support is more beneficial to health outcomes than received support (e.g., Haber et al., 2007; Helgeson, 1993; Lindorff, 2000).

It is important at this point to separate social support from other social relationship constructs such as social networks, social integration, and social capital. Social networks refer to the links that an individual has to other people. Therefore, while social support may come from these social networks it may not be guaranteed. Social integration refers to the existence of social ties and the quantity and quality of these relationships. Again, people who are more socially integrated may or may not offer social support to others. Finally, social capital is used to describe certain resources and norms that arise from social networks (Ferlander, 2007). Nevertheless, social capital does not ensure that support is made available to people when in stressful situations. Therefore, social support can be seen as the act of

providing or perceived availability of support from others (e.g., friend's family, colleagues, and significant others), rather than just simply the social environment an individual is in.

Social support is considered to be among our basic needs (Maslow, 1943), and a lack of social support leads to social isolation. As a result, similar to the belonging hypothesis (Baumeister & Leary, 1995), this can lead to negative effects on health-related outcomes. The need to feel a connection to others, is also seen in the 'relatedness' aspect of the self-determination theory (SDT; Deci & Ryan, 2000), pertaining a basic psychological need for human motivation and personality. One of the most significant outcomes of social support is the relationship it has on improving physical and psychological health (Beals, Peplau, & Gable, 2009; Cohen, Gottlieb, & Underwood, 2000; Uchino, 2009). In fact, not having a strong social support network is a risk factor for mortality as large as smoking more than fifteen cigarettes a day and is comparable to other well-established risk factors for mortality such as excessive alcohol consumption, lack of physical activity, being obese, and living in a highly polluted city (Holt-Lunstad et al., 2010). Studies have shown individuals with low levels of social support have higher mortality rates from cardiovascular disease (e.g., Berkman, Leo-Summers, & Horwitz, 1992). While greater levels of social support has been linked with lower mortality rates from cancer (Ell et al., 1992) and HIV (Lee & Rotheram-Borus, 2001). Nevertheless, these results have been seen to vary for both perceived and received support. For example, perceived support is consistently associated with positive health outcomes (Holt-Lunstad et al., 2010; Smith et al., 2012; Uchino, 2004, 2009) and even reduced amygdala activity (Sato et al., 2020). Whereas, received support has often shown inconsistent effects on health, and even negative outcomes have been found (Bolger & Amarel, 2007; Uchino, 2009).

While there has been substantial research showing convincing links between social support and better health outcomes, the exact mechanisms are less clear. Despite this, two

potential mechanisms have been proposed. The first is the direct-effects (also called main effects) hypothesis, which proposes that social support is beneficial all the time, regardless of whether the supported person is experiencing stress or not. For example, a meta-analysis demonstrated that social support reduced the strains experienced in the workplace, but weak effects were seen for the link between social support and work stress (Viswesvaran et al., 1999). This suggests that social support is not necessarily only beneficial when stressors are encountered, thus providing support for the direct effect's hypothesis. This direct-effects hypothesis is well-acknowledged in health-promoting effects of social support (Knox & Uvnäs-Moberg, 1998), which suggests social support acts in a way that influences health behaviours. Nevertheless, it has been argued that health outcomes have only been explained by a small percentage of social support effects (Lepore, 1998).

The second mechanism states that social support has more of an influence on the factors related to a stressful situation. For example, social support is typically based around the networking of people and this then helps individuals cope with stressful events. This is known as the buffering-effect hypothesis. This type of support can be divided into two categories, both psychological and non-psychological sources of social support (Cobb, 1976). Psychological support is around the provision of information (e.g., coping resources), whereas the non-psychological support refers to the provision of material aid (i.e., money). According to the Social Comparison Theory (Festinger, 1954), individuals have a need to evaluate and compare their own thoughts and opinions with others in order to reduce uncertainty in particular domains. More specifically, when it comes to stressful situations, individuals tend to draw on others for information on appropriate emotional responses, and for relevant information to best deal with the situation. As such, social support can help individuals assess their own coping abilities in the face of adversity, or draw upon others for extra help (Cohen & McKay, 1984). The buffering hypothesis has been termed the most

influential theoretical perspective in social support, given its influence on the stress response (Lakey & Cohen, 2000).

Supporting evidence for the two proposed mechanisms of social support can be found in reviews (e.g., Cohen, 1988; Cohen et al., 2000; Teoh & Hilmert, 2018; Uchino, 2004, 2006). Of current interest, social support has also been associated with the processes underpinning performance in a range of domains, including cognitive tasks (e.g., Sarason & Sarason, 1986), job performance (e.g., AbuAlRub, 2004; Fong, 1992; Park, Wilson, & Myung, 2004), and academic performance (e.g., Malecki & Demaray, 2006). More recently interest has grown within in a sporting context. For example Rees and Hardy (2004) found support for both the direct and stress-buffering effects of social support on tennis performance. Similar effects were also found in golfers (Freeman et al., 2009; Freeman & Rees, 2008; Rees & Freeman, 2007). It has also been suggested that social support moderates the relationship between stressors and task performance through self-efficacy (Rees & Freeman, 2009). Rees and Freeman examined 197 amateur golfers in a natural setting and gathered measures of stressors, social support, and self-efficacy prior to performance. The results revealed that social support had a main effect and further acted as a moderator between stressors and task performance. This was more pertinent when stressors were high as only those with high levels social support were seen to maintain performance levels. Conversely, for low levels stressors, social support was comparatively unimportant which is supportive of the buffering hypothesis. Although the study was cross-sectional so causal inferences cannot be made. A more recent study found that self-efficacy could not explain performance differences between support conditions (Moll et al., 2017). Therefore, the findings are mixed, but do offer a useful insight into the potential mechanisms of the social support-performance relationship. In summary, both the direct and stress-buffering hypotheses suggest that social support may act as a stress buffer as well as enhancing health,

well-being, and even influencing factors involving performance outcomes. This review however will now focus more on how social support can influence the stress process and associated performance related outcomes rather than any specific health outcomes associated.

Social support has an influence on both psychological and physiological factors of stressful situations (e.g., exams, interviews, public speech etc). For instance, the stress and coping literature (e.g., appraisal theory), which is aligned to the buffering hypothesis suggests that support from others influences the stress appraisals (e.g., enhancing their sense of control). As a result, this causes a psychological reaction, which then triggers a physiologically health related response (Gramer & Reitbauer, 2010). As seen earlier, Lazarus and Folkman's (1984) appraisal theory posits that stress arises if an individual appraises a situation as potentially harmful or threatening to their well-being or self-esteem, and then perceiving themselves as not having appropriate resources to cope with that stressor. However, social support is thought to intervene in the process by influencing the secondary appraisal (i.e., the person's ability to cope with a stressor). For example, adequate support may lessen the impact the stress appraisal has, by providing a solution to the problem, or through reducing the perceived importance of it (Cohen & McKay, 1984). In addition, social support can act as a resource, and is apparent in various forms such as emotional support (i.e., empathy and acceptance), instrumental or tangible support, (i.e., provision of material aid) or appraisal support (i.e., provision of information that leads to alternative assessments of the stressor itself or one's ability to cope with it) (House, 1981; Cohen & McKay, 1984). Social support then is also likely to increase individuals' perceptions of being able to deal successfully with stressors as they can draw upon and utilise collective actions (Skaalvik & Skaalvik, 2007). Further support for this comes from Slater, Evans, and Turner, (2016) who suggested social support could also influence the perception of both the resource and demand appraisals. A study by Dixon, Turner, and Gillman (2016) explored the relationships between

challenge and threat cognitive appraisals and coaching behaviors in football coaches. Results revealed that coaches with a tendency to appraise a stressor as a challenge are more likely to offer social support to their athletes. This suggests a reciprocal relationship between challenge and threat appraisals and social support, meaning those who display a challenged state perhaps have more capacity to offer support to others because they can cope with the demands of the situation.

Thus far, the research has suggested that social support only has beneficial effects to health, stress, and performance outcomes. However, various studies have demonstrated that supportive actions (received support) can actually be variable with some reporting null, or even negative effects (Bolger et al., 2000; Deelstra et al., 2003; Gleason et al., 2003; Palant & Himmel, 2019; Peeters & Le Blanc, 2001; Searle et al., 2001). For example, in diary studies using couples under stress (Bolger et al., 2000) and under no stress (Gleason et al., 2003), participants were asked to record their daily levels of distress and levels of received support. Findings from both studies revealed that participants felt more anxious and depressed (higher negative mood) on days following their reported receipt of support. In another study, Deelstra and colleagues (2003) found that imposed (compared with no support) instrumental social support was stress inducing through both self-report (affect & self-esteem) and physiological markers (e.g., heart rate) rather than alleviating, in a sample of temporary workers. More so, the negative reactions to the support were moderated by the extent the participants needed support. In this case, imposed support was perceived as less negative (neutral) when participants had a higher need for support (the task could not be completed without help). However, the study had a gender imbalance with more female than male participants raising concerns about generalisability. In addition, the confederate providing the support was female, so it is unclear if there were any gender related effects of the support provided and received. Nevertheless, this study was the first to offer experimental

investigation of the negative effects of instrumental support and raises questions around whether the same effects can be seen across the other forms of support (e.g., emotional, information, esteem).

Researchers have attempted to explain some of the negative findings associated with social support and have suggested that supportive actions can be misinterpreted (Lehman & Hemphill, 1990; Rosland et al., 2012), or create feelings of inequality and indebtedness (Bolger & Amarel, 2007; Gleason et al., 2003), be a threat to self-esteem (Fisher et al., 1982), and reduce self-efficacy and confidence (Bolger & Amarel, 2007) following the support. It is also suggested that the support might not meet the need of the recipient (Cutrona & Russell, 1990; Matire et al., 2002) and that age could be an important factor (Scholz et al., 2012). The ‘visibility’ of social support has been proposed which offers an explanation to the mixed effects of support interactions (Zee & Bolger, 2019). Support visibility refers to the degree to which assistance is noticed or acknowledged by the recipients as support (Bolger et al., 2000; Bolger & Amarel, 2007). When support is explicit and direct (visible), this can sometimes increase the salience of stressors and reduce autonomy and self-efficacy of the recipient by undermining their ability to cope and suggest they require the help from others (Bolger et al., 2000). Whereas, support which is subtle and indirect (invisible), can increase recipients’ perceptions of their personal resources (i.e., self-efficacy) to cope with the situation (Zee & Bolger, 2019). For example, offering practical advice on how to deal with a demanding situation would be considered ‘visible’ support. Whereas creating more quiet space for a person to work or normalising the demanding situation by talking about how others have dealt with similar experiences during interpersonal interactions would be examples of ‘invisible’ support. Another explanation for the ambiguous effects of social support could be that very few studies (e.g., Deelstra et al., 2003) have used experimental data and have thus based findings on correlational research designs. As such, causation cannot be assumed and it

may be that distress could increase support rather than vice versa, along with the possibility of a third variable being involved (Seidman et al., 2006). Therefore, it is apparent that the research related to received and provided support are more complex than previously thought and more rigorous methodological studies are required to understand such dynamics (Nurullah, 2012; Shrout et al., 2010). Nevertheless, the previous research highlights that social support may not solely induce positive effects and suggests a need to understand and explore what makes supportive actions effective, which provides additional justification and scope for the current thesis.

To further understand the social processes that may be involved in the stress response, the next section will look at the social identity approach, which highlights the importance of group processes in understanding both individual and group cognition and behaviour (Tajfel & Turner, 1979; Turner et al., 1987). Social identity is also seen as having an important role in the stress response as it provides a basis for individuals to interpret support in ways that are more beneficial (Ketturat et al., 2016). Within the sociopsychobio model (Haslam et al., 2019), there is an emphasis on the role of group memberships and associated identities in influencing the psychology and biology of stress. In particular, it is argued that social support is underpinned by social identity (Haslam et al., 2012). The social identity approach offers a more in-depth explanation to group processes and behaviour compared to alternative approaches such as the need to belong (Baumeister & Leary, 1995) and the need to feel connected as seen in the ‘relatedness’ aspect of the SDT (Deci & Ryan, 2000). The following section will outline the social identity approach and highlight some of the outcomes of having a shared group membership.

### **1.9 The Social Identity Approach**

A group can be considered when “two or more individuals who possess a common identity, have common goals and objectives, share a common fate, exhibit structured patterns



of interaction and modes of communication, hold common perceptions about group structure, are personally and instrumentally interdependent, reciprocate interpersonal attraction, and consider themselves to be a group” (Carron & Hausenblas, 1998, p. 13–14).

The majority of research regarding inter-group and social behaviours has been developed around two core theories, the Social Identity Theory (SIT; Tajfel & Turner, 1979), and the Self-Categorization Theory (SCT; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987), often referred to as the social identity approach (Haslam, 2004). Social identification reflects the extent to which an individual feels they belong to a group (e.g., an organisation, a sport team; Haslam, 2004; Tajfel & Turner, 1979). SIT posits that in social contexts people can define themselves as individuals (i.e., personal identity; ‘I’ and ‘me’) and as group members (i.e., social identity ‘we’ and ‘us’). In other words, personal identity reflects an individual’s perception of themselves to be distinct and different from other people in an environment. Instead, social identity refers to “that part of an individual’s self-concept which derives from his membership of a social group (or groups), together with the value and emotional significance attached to this” (Tajfel & Turner, 1979, p. 63). Expanding SIT further, SCT provides the explanation of psychological group formation and analysis of the functioning of categorisation processes in social perception and interaction. In essence, it is the processes that leads people to believe they share (or do not share) group membership in the first place, and with the ways in which this then affects their understanding of the world and their interactions within it (Haslam, 2014).

As a result, the groups we belong to define who we are (Tajfel & Turner, 1979; Turner et al., 1987), and the way in which an individual thinks and behaves are coherent with their personal or social identity. For example, when individuals perceive to have a meaningful attachment to a group, their thought processes and actions adapt to their social identity (Adarves-Yorno et al., 2006). Typically, within a social context there are two types

of groups: the in-group and out-group. An in-group are those who feel like they belong to a certain group or organisation (e.g., a sports team they play for, or an employee working for a certain organisation), whereas an out-group is a group that a person does not feel they psychologically associate with (e.g., a rival sports team, or a different organisation to their own). Therefore, individuals divide groups into “us” and “them” based on the social categorisation process (Turner et al., 1987). Accordingly, group members of an in-group will often search for negative aspects and discriminate against the out-group to improve their self-image (Tajfel & Turner, 1979). Whereas, people tend to evaluate other in-group members more positively and this has been associated with long-term benefits (e.g., Brewer, 1979). On the other hand, this group bias can have negative effects on those in the out-groups, leading to deprivation and resentment (De Dreu, 2012). Furthermore, the stronger the identification with a group, the more that individual sees themselves in terms of that group membership (Van Knippenberg, 2011). Consequently, this provides a foundation for group behaviour and motivates individuals to advance their groups interest (Slater et al., 2014).

However, Sluss and Ashforth (2007) stated that the study of identification has largely focused on the individual or the group as collective, and have ignored the interpersonal level of relationships. Therefore, relational identification is a significant factor when looking at inter-group and social behaviours. Derived from the SIT, relational identification can be defined as “the extent to which one defines oneself in terms of a given role-relationship” (Sluss & Ashforth, 2007, p.11). In other words, the strength of interpersonal relationships between dyads (e.g., within the workplace) can provide understanding of how individuals define themselves in group settings. This has been supported more recently by Slater et al. (2018) who stated that relational identification has often been neglected in leadership research. In a series of studies, Slater and colleagues found that high relational identification with a leader increases follower mobilisation, resource appraisals and cognitive task

performance. In addition, CVR data showed that low relational identification elicited a threat response to a pressurised task compared with those in the neutral condition, who displayed a greater level of challenge.

Despite the dearth of research into the outcomes of relational identification, there has been a great deal of research examining the role of social identification on an array of different outcomes. The following section will critically discuss this in more detail.

### **1.9.1 Outcomes of a Shared Identity**

Having a shared identity can lead to a number of positive outcomes, for example, if certain groups provide stability, meaning and purpose, and direction for the person, then this will likely have positive implications for their mental health (Haslam, Jetten, Postmes, et al., 2009). Although, benefits are not just seen in mental health, having a shared identity has been seen to impact a range of other health related outcomes. Some of these include a reduction in burnout (Haslam, Jetten, Postmes, et al., 2009), reduced smoking behaviours (Kobus, 2003), higher participation in health promoting activities (Laverie, 1998) and improvements in overall well-being (Matheson & Cole, 2004). In contrast, a lack of social identity has been reported to have the opposite effect, leading to negative consequences to overall health and well-being (Cruwys et al., 2014). A large body of research has been conducted in this area over the last decade across multiple domains to understand the social identity process in health, and has led to the notion and promotion of the ‘social cure’ (Haslam et al., 2018). More recently, a ‘sociopsychobio’ model was put forward, which aims to encapsulate the role of group factors (social class, social capital, social networks, social support) in shaping health related outcomes (Haslam et al., 2019). Specifically, rather than view the biology, psychology and social influences as distinct factors, they are interdependent providing important mechanisms to drive positive change in health (Haslam et al., 2020).

However, while the social identity approach has become a useful framework for understanding health outcomes, there are other areas where a shared identity can have an influence and benefit. For example, social identification is also associated with higher group confidence (Fransen et al., 2015), high levels of personal self-sacrifice, often shown in selfless acts and citizenship (Tyler & Blader, 2003; Van Dick et al., 2004), effective change management (Slater, Evans, & Turner, 2016), and increased social support (Haslam et al., 2005). High levels of group identification also predicted higher levels of citizenship, pride, overall work satisfaction, and reductions in burnout, in a longitudinal study examining the effect of social identification in two theatre production groups (Haslam, Jetten, & Waghorn, 2009). Another well documented outcome of social identity and of relevance to the current thesis, is the relationship it has with stress and coping. To illustrate, groups and social identities provide another dynamic to the stress process for example, they can be the basis for social judgement, social influence, trust and corporation (Ellemers, Spears, & Doosje, 1999; Haslam, 2004). In other words, members of the group may influence the psychology of in-group members when it comes to stressful situations. It should be noted that the appraisal theory is commonly used to understand stress within this area. In particular, Lazarus' concept of stress and coping is a framework that can be seen to expand in order to understand the social dimensions of the stress process (Haslam, 2004). Within the sociopsychobio model (Haslam et al., 2019) there is a focus on the role of group memberships and associated identities in influencing the psychology and biology of stress.

### **1.9.2 Social Identity and Stress**

“Groups are thus a source of stress, but they can also be the key to overcoming it” (Haslam, 2004, p. 191).

Groups and organisations can be considered a catalyst for producing demanding environments and thus perceptions of stress. However as alluded to in the above quote,

having a social network and a sense of belonging to a group(s) can also be an asset in the face of stress. In particular, the relationship between social identity and stress has been explored using the integrated social identity model of stress (ISIS; Haslam & Reicher, 2006). This model is the amalgamation of the self-categorization model of intergroup dynamics of stress (SCS: Haslam, 2004), and the social identity model of intergroup dynamics of stress (SIS). The SCS broadly states that there will be times in which an individual's sense of self is primarily informed by their group membership. As a result, their appraisals of the stressor will depend on how they are viewed by the group, rather than them solely as an individual. Subsequently, this opposes Lazarus and Folkman (1984) appraisal theory, which conceptualises the self as only individualistic (Haslam, 2004). The SIS on the other hand, was derived from the SIT (Tajfel & Turner, 1979), and relates to status inequality and the framework outlined in SIT to help understand the basis of different coping responses to stress (Haslam & Reicher, 2006). More specifically, it explains how individuals can transform negative experiences of stressors into more positive outcomes, mainly through individual avoidance, or cognitive processes. Together, these models form the ISIS model, which places social identity at the centre of the stress process. In doing so, it first explains variations in the levels of stress experienced by being related to group membership. Secondly, the ISIS model highlights identity as mediating the stress well-being relationship. More specifically when social identity is present, the individuals are influenced by group experiences (Gallagher, Meaney, & Muldoon, 2014). In light of the ISIS model, it was proposed that social identity can buffer against stress in three ways: 1) social identity alters appraisal processes, 2) social identity increases social support, and 3) social identity increases the effectiveness of social support (Haslam, Jetten, Postmes, et al., 2009). Each of these will now be explored in more detail.

As outlined earlier, the appraisal theory (Lazarus & Folkman, 1984; Lazarus, 1966) states that it is how an individual actually perceives a stimuli (primary appraisal) which can impact how they cope with that stress response (secondary appraisal). As such, scholars have demonstrated the moderating role which social identity can have in both appraisal processes. To outline, it is thought a shared social identity may influence the primary appraisal by providing a common interpretive framework (e.g., Haslam & Reicher, 2006). For example, members of the group share common perspectives on the situation and interpret in similar ways. In other words, those group members who have a shared identity on a situation change from the individual to group level, (e.g. “could this be dangerous to me?” to “could this be dangerous to us?”; Ketturat et al., 2016). An example of this comes from Levine et al. (2002), who reported the role of social identity in the primary appraisal of female sportswomen. They found that a threat of a knee injury was more stressful than a threat of a facial scar when identifying as a sportsperson, whereas the opposite outcome was found when identifying as their gender identity. Similarly, researchers have shown the role social identity plays in the secondary appraisal by shifting the appraisal process from individual to group level (Ketturat et al., 2016). As a result, when coping with a stressor, the resources from the group are taken into account within individual appraisal (Haslam et al., 2004, 2005). An example of this could be seen from the offering of social support by others.

Individuals who identify strongly with a certain group (e.g., with their sports team) are also more likely to experience social support from other members of that group (e.g., Avanzi et al., 2015; Branscombe et al., 1999; Haslam et al., 2005; Levine et al., 2005). To phrase differently, individuals are more likely to offer help to people they perceive as belonging to the in-group, and equally, they are more likely to receive help from others who perceive them as belonging to the same in-group. For example, Levine et al. (2005) found that an injured stranger wearing an in-group football team shirt, was more likely to be helped

than if wearing a rival team shirt or if wearing a plain shirt. This can be seen in a real-life example when in August 2019 Liverpool player Mohamed Salah turned his car around to help a boy (wearing the team shirt) who injured himself when trying to run after the car to meet the player. In another study looking at bomb disposal officers and bar staff, Haslam et al. (2005) found strong positive correlations between social identification with both social support and life/job satisfaction. In addition, the relationship between social identification and stress was mediated by social support. Therefore, suggesting that social identity plays an important role for social support to achieve its effects.

Accordingly, not only does having a shared social identity increase the likelihood of social support, but it has been shown to increase the effectiveness of the support received. This is largely down to the idea that a shared social identity provides a basis for individuals to interpret support in ways that are more beneficial (Ketturat et al., 2016). In support of this Frisch et al. (2015) found that emotional social support buffered neuroendocrine stress reactions only if a shared social identity was apparent between the provider and receiver. As outlined previously, a number of studies have demonstrated that the effects of social support can actually be inconsistent with some reporting null, or even negative effects (Deelstra et al., 2003; Palant & Himmel, 2019; Peeters & Le Blanc, 2001; Searle et al., 2001). Researchers have also shown that emotional social support is not always effective and sometimes has no impact on buffering against stressful situations (e.g., Allen et al., 1991; Anthony & O'Brien, 1999), and can even be detrimental, and heighten stress reactions (e.g., Bolger & Amarel, 2007; Maisel & Gable, 2009). As such, received support in particular may in fact lower self-esteem, draw more attention to the problem and lead to implicit criticism (e.g., feelings of inequality, threat to self-esteem) (Shrout, Herman, & Bolger, 2006). Thus, having a shared social identity can be useful to interpret support in a more beneficial way, and prevent

individuals from misinterpreting the support being offered (Bolger et al., 2000; Ketturat et al., 2016).

In summary, having a shared social identity has proven to have several positive effects on health and well-being. Further to direct effects, having a group membership has also shown to have indirect effects on health and well-being through moderating the effects of social support. Moreover, social identity is thought to influence the appraisal process and provide a basis for the provision and receipt of social support. Therefore, if social support and social identification can be seen to influence the appraisal process, then it is likely to influence the physiological patterns in line with the BPSM and the TCTSA. For example, social support has also been seen to have an impact on physiological stress reactions, such as cortisol secretion (e.g., Häusser et al., 2012; Heinrichs et al., 2003), and reductions in blood pressure and heart rate (e.g., Lepore, Allen, & Evans, 1993). As such, the following will now explore how both social support and social identification can influence physiological patterns, in particular regarding cardiovascular reactivity (CVR).

### **1.9.3 The Effect of Social Support and Social Identification on Cardiovascular Reactivity**

The precise mechanisms underpinning the effects of social factors on stress and the accompanying CVR patterns is still largely unknown and an unexplored area (Carroll & Sheffield, 1998; Jetten et al., 2012; Teoh & Hilmert, 2018). Given that stress is an independent risk factor for cardiovascular disease (CVD; Chida & Steptoe, 2010; Dimsdale, 2008), research exploring the stress-buffering effect of social factors (e.g., social support and social identification) offers a fruitful avenue for investigation. The next section of the review will outline research studies that have explored social factors and CVR associated with the stress response.



The research focusing on the possible physiological responses to stress has mainly been carried out in a laboratory setting using stress paradigms with measurements of CVR indices (e.g., blood pressure, heart rate). Many of these studies have used social stressors (i.e., public speaking, mental arithmetic, interviews) to produce a social-evaluative threat. One well established method for inducing social stress is the Trier Social Stress Test (TSST; Kirschbaum et al., 1992; Kirschbaum et al., 1993). The TSST is formed around public speaking and a mental arithmetic task, which has been shown to be an ecologically valid stressor which is reliable to induce an acute stress response (Allen et al., 2017; Dickerson & Kemeny, 2004; Hellhammer et al., 2007). The aforementioned tasks elicit many cognitive aspects (e.g., evaluation, fear of failure, unpredictability) that could influence CVR (Smith et al., 1997). In fact, the anticipation of a stressor is enough to elicit physiological responses and negative affect similar comparable to those during the stressor itself (e.g., Baum & Koman, 1976; Spacapan & Cohen, 1983). For example, heightened CVR responses have been shown to occur during the period of preparation time the participants are given prior to a public speech task (e.g., Lepore, Allen, & Evans, 1993). Social-evaluative threat has been adopted in research paradigms to explore a range of psychological characteristics and outcomes including social support. In order to examine the effect of social support on CVR, two methods have been used (Phillips et al., 2009). One method has been to provide active support towards a stressor or challenging task through the use of a supportive other(s). The second method has been to provide passive support using other(s). However, the participants' relationship with the other supportive individual(s) has varied (i.e., friend or stranger).

The general consensus from the findings suggest that the presence of supportive or significant others may reduce CVR during an acute stressor (see Broadwell & Light, 1999; Christenfeld et al., 1997; Fontana et al., 1999; Gerin et al., 1992, 1995; Glynn et al., 1999; Kamarck et al., 1990; Kamarck et al., 1995; Kors et al., 1997; Lepore et al., 1993;

O'Donovan & Hughes, 2008; Phillips et al., 2009, 2006; Thorsteinsson & James, 1999). For example, Kamarck et al. (1990) presented participants with two laboratory tasks (mental arithmetic and a visual-verbal test) with either being alone or accompanied with a friend. Results showed that those in the friend condition had attenuated heart rate and blood pressure compared with the alone condition. However, no differences in emotional response or task performance were found. Christenfeld et al. (1997) then conducted a study on female college students either in the presence of actively supportive friends or strangers, or in the presence of non-supportive strangers on approach to a speech task. The findings revealed that those actively supported (either friend or stranger) displayed attenuated CVR compared with those in the the non-supported stranger condition. However, without the inclusion of a non-supportive friend condition, the full extent of these dynamics are unclear. In an attempt to address this, Phillips et al. (2009) examined eight experimental conditions (active supportive male friend; active supportive female friend, passive male friend; passive female friend; active supportive male stranger; active supportive female stranger, passive male stranger; and passive female stranger). CVR on approach to a mental arithmetic stress task was measured in 112 young women. Overall findings demonstrated that support from a friend rather than a stranger was associated with attenuated blood pressure reactivity, but only when the provider of that support was male. Further, support from a male stranger or a female friend was associated with an increase in blood pressure reactivity. As such, this study demonstrates the complexity of the interactions between the relationships and sex of the support provider and recipient. Although it should be noted that many of the studies mentioned have consisted of female participants, therefore there is a distinct lack of male representation within this area of research.

Not all support is seen to have beneficial effects in stressful situations (Anthony & O'Brien, 1999; Closa León et al., 2007; Hilmert, Christenfeld, et al., 2002; Hilmert, Kulik, et

al., 2002; Taylor et al., 2010). For instance, some studies have shown heightened reactivity in the presence of a supportive partner (e.g., Allen et al., 1991; Gramer & Reitbauer, 2010; Phillips et al., 2009), or no effects of support on reactivity (Christian & Stoney, 2006; Craig & Deichert, 2002; Gallo et al., 2000; Sheffield & Carroll, 1994; SnyderSmith & Cacioppo, 1992). To illustrate, Allen et al. (1991) found greater reactivity and poorer performance in a mental arithmetic task in those within a friend support condition compared with alone, or with a pet dog condition. Across two experiments, Hilmert, Kulik, et al. (2002) found evidence for social support both attenuating and increasing CVR depending on whether the experimenter was present or absent during task performance. When the experimenter was present, social support from the audience decreased CVR compared to a non-supportive audience. On the other hand, when the experimenter was absent, social support from the audience increased CVR and had no effect on anxiety. Similar findings were also seen in a study by Hilmert, Christenfeld, et al. (2002), who found that with the experimenter out of the room, participants who received support from two confederates during a speech task experienced greater CVR than participants who performed in the presence of two non-supportive confederates. In addition, these effects were mediated by the number of words produced during the speech task. That is, social support increased the number of words produced (increased effort), which as a result increased CVR. More recently, Moore et al. (2014) also reported that perceptions of support availability had no significant effect on participants' demand/resource evaluations, CVR responses, or performance on a novel motor task.

The findings from the experimental studies appear to be equivocal in establishing the extent to which social support can have an influence on CVR. Nonetheless, these inconsistencies in results may be a consequence of the variations in the type of support given within these studies (Thorsteinsson & James, 1999). For example, silent support from others

is seen as less effective than active verbal support, or evaluation from those supporting (Gramer & Reitbauer, 2010); or perhaps it is because of the differences between perceived and received support (Bolger & Amarel, 2007). Further, the mere presence of others does not necessarily mean support will be perceived by the recipient and differences are seen between active or passive support conditions (Phillips et al., 2009). The social comparison theory (Festinger, 1954) has been cited to help explain the influence of social relationships on psychophysiology (Gerin et al., 1992; Phillips et al., 2009), by suggesting that individuals have the innate drive to look to others to evaluate their own abilities. Although, further research is needed to support and fully understand the mechanisms involved in social support and cardiovascular functioning (Gallagher et al., 2014; Uchino et al., 2011). In a recent review, Teoh and Hilmert, (2018) also highlighted that effort-related variables may be a moderator in the social support CVR relationship. In other words, a participant's level of engagement within the stress task/situation moderated the effect of social support on CVR. Overall, there appears to be a dearth of recent research exploring social support effects on CVR (especially using male participants) and no single theoretical model to encapsulate these effects. Nevertheless, the research looking at the effect of social identification and CVR helps to provide further insight to the role of social factors on the cardiovascular stress response.

In most of the studies that involved friend-stranger support conditions there will be a level of relational identification between the dyads. As such, by taking into account the stress-buffering effects of social support through social identification (e.g., Haslam & Reicher, 2006), it could be argued to play an important role in the stress response. Although measures of identification with the supportive partner have seldom been acknowledged in past research, so it is still unclear of the exact link. Nevertheless, relationship factors (e.g., closeness and overall quality) have been considered in previous literature when looking at the effectiveness of social support (e.g., Abbey et al., 1995; Acitelli & Antonucci, 1994; Gleason

et al., 2008; Yazdani et al., 2016), but most have only focused on romantic and spousal relationships (Birditt et al., 2012). As such, relational identification offers a broader concept of potential supportive pathways through a greater network of dyadic relationships (e.g., co-workers, sport team members). While evidence for this is scant, Slater et al. (2018) were the first to examine relational identity and CVR in line with challenge and threat theory. While research on relational identification and CVR responses may be limited, studies exploring the wider theory of social identity offers a greater insight into the psychophysiological link (e.g., cardiovascular responses) and is worthy of further exploration.

Cardiovascular responses in line with the challenge and threat states have been reported when looking at social identity specifically. As outlined earlier (section 1.7.5), researchers have explored identity-threat in line with challenge and threat (Blascovich, Mendes, et al., 2001; Derks et al., 2011; Scheepers, 2009; Scheepers & Ellemers, 2005; Vick et al., 2008). To illustrate, Scheepers and Ellemers, (2005) was one of the first studies to have integrated social identity theory and the CVR indices in line with BPSM. They argued that past research lacked assessment of social identity threat, instead threat has been inferred from the result of being an out-group rather than directly measured (e.g., objective markers). In their study, they found that individuals who had their social identity put under threat (i.e., high vs low status groups), also displayed cardiovascular responses indicative of a threat (increases in blood pressure). This was regardless of whether participants were in either high or low status groups. However, the study did not examine some of the more nuanced markers of challenge and threat (i.e., CO & TPR) therefore, it was not possible to measure challenge responses. In later studies using the more comprehensive markers, Vick et al. (2008) found women performing a math task while primed with social identity threat displayed CVR indicative of a threat response. In an inter-group context, Scheepers, (2009) found that within three group problem solving tasks, participants in the low status group (told their group

performed worse than the out-group) displayed threatened CVR patterns when the status hierarchy was stable (performance on the first task was a good predictor of performance on the second task), whereas they displayed challenged CVR patterns when the status hierarchy was unstable (performance on the first two tasks was a poor predictor of performance on the third task). Participants of the high-status group (told their group performed better than the out-group) displayed threatened CVR when the status differences were unstable, but not when they were stable. These aforementioned studies have largely focused on the outcomes of social identity threat in accordance to challenge and threat CVR patterns. However, Derks et al. (2011) was interested in how perceptions of social identity can be altered to elicit challenge through self and group affirmations. They found that after self-affirmations, low gender identified women displayed challenged CVR and felt they could cope with the negatively stereotyped task (car parking computer game task). Conversely, high gender identified women did not benefit from the intervention and displayed threatened CVR. However, group-affirmations were more effective for high identifiers as they displayed challenged CVR towards the task. Whereas group-affirmations did nothing for the low gender identified women who continued to display threatened CVR towards the task. These findings demonstrate differences under social identity-threat depending on high or low identifiers. As such, targeted affirmations can be effective as a method to cope with a difficult task.

More recently, Gallagher et al. (2014) carried out a study looking at the cardiovascular reactions of participants carrying out a maths test. Participants were exposed to a message describing the test as stressful or challenging, by either an in-group member (a student) or out-group member (a stress disorder sufferer). Results showed that those who were told the maths task was stressful by in-group members reported more stress, had higher diastolic blood pressure and heart rate, and produced poorer performance than those who

were told the task was challenging by in-group members. Those who received the message from the out-group displayed very little differences in CVR or stress appraisals. Therefore, results show support for the influence that social contexts can have in terms of CVR and self-report stress appraisals. Although similar to past research (e.g., Scheepers & Ellemers, 2005), the study did not measure the more detailed blood pressure indices seen within the challenge and threat framework. Nevertheless, these studies provide further support for the social identity processes which manifest in psychological and physiological adaptations towards stressful situations. Moreover, the usefulness of challenge and threat as the theoretical underpinning is acknowledged.

In summary, the collected research has revealed some inconsistent findings on the psychological and physiological benefits of social support on the stress response. While it has been suggested that this is partly due to a potential moderator (e.g., engagement in task) that has not been accounted for (Teoh & Hilmert, 2018), others have suggested social identification having an important role (e.g., Avanzi et al., 2015; Branscombe et al., 1999; Haslam et al., 2005; Ketturat et al., 2016; Levine et al., 2005), especially in the effectiveness of social support. The challenge and threat framework set out by the BPSM and TCTSA offers a valuable foundation to encapsulate both the psychological and physiological benefits. Nevertheless, currently there is a distinct lack of research examining both social support and social identity using the same theoretical model. Given the reported benefits seen within the interplay between social support and social identity, this warrants further attention. There are arguably glimpses of the social influences (i.e., danger to esteem, verbal persuasion, avoidance goals) within general challenge and threat theory. Yet, there is no core element of these social aspects within the theories, which is imperative and fundamental to advancing the understanding of the human stress response.

### 1.10 Summary and Aims of Thesis

Challenge and threat theories have largely focused on individual differences (e.g., personality) and personal factors (e.g., perceptions of control, self-efficacy, self-esteem) on approach to a motivated performance situation. For example, both the resource and demand appraisals have included individual perceptions (e.g., self-efficacy, perceived control, effort). Consequently, there is no underpinning theoretical approach which acknowledges the potential effect that social support and social identification can have and the possible role it can play in how individuals approach a motivated performance situation. Furthermore, very few studies have examined the connection between social support and social identity, and made direct links to challenge and threat states (see Dixon et al., 2016; Dixon & Turner, 2018; Miller et al., 2020; Slater et al., 2018 for exceptions).

To advance the understanding of the transactional model of the stress response and accompanying appraisal process, it is essential to consider the integration of social factors. Thus, given that psychosocial factors such as social support and social identification can enhance resource appraisals (Gallagher et al., 2014), perhaps the likelihood of approaching stressful situations as a challenge rather than a threat may be greater when we share a social identity and have high social support. In other words, if one's social identity and support can enhance appraisals such as self-efficacy (e.g., Miller et al., 2020; Rees & Freeman, 2009), perceptions of control (e.g., Cohen, 1988; Schwarzer & Leppin, 1991) and approach goals (i.e., achievement goals) (Lee & Ybarra, 2017), then we would expect to see a challenge response on approach to a stressful situation. In support of this, Slater et al. (2016) suggests that social support may be a valuable resource to encourage challenge states especially if underpinned by social identification. Additional support comes from Slater et al. (2018) who also found relational identification with a leader increased resource appraisals and influenced CVR in line with challenge and threat theory. As such, it could be that high levels of social



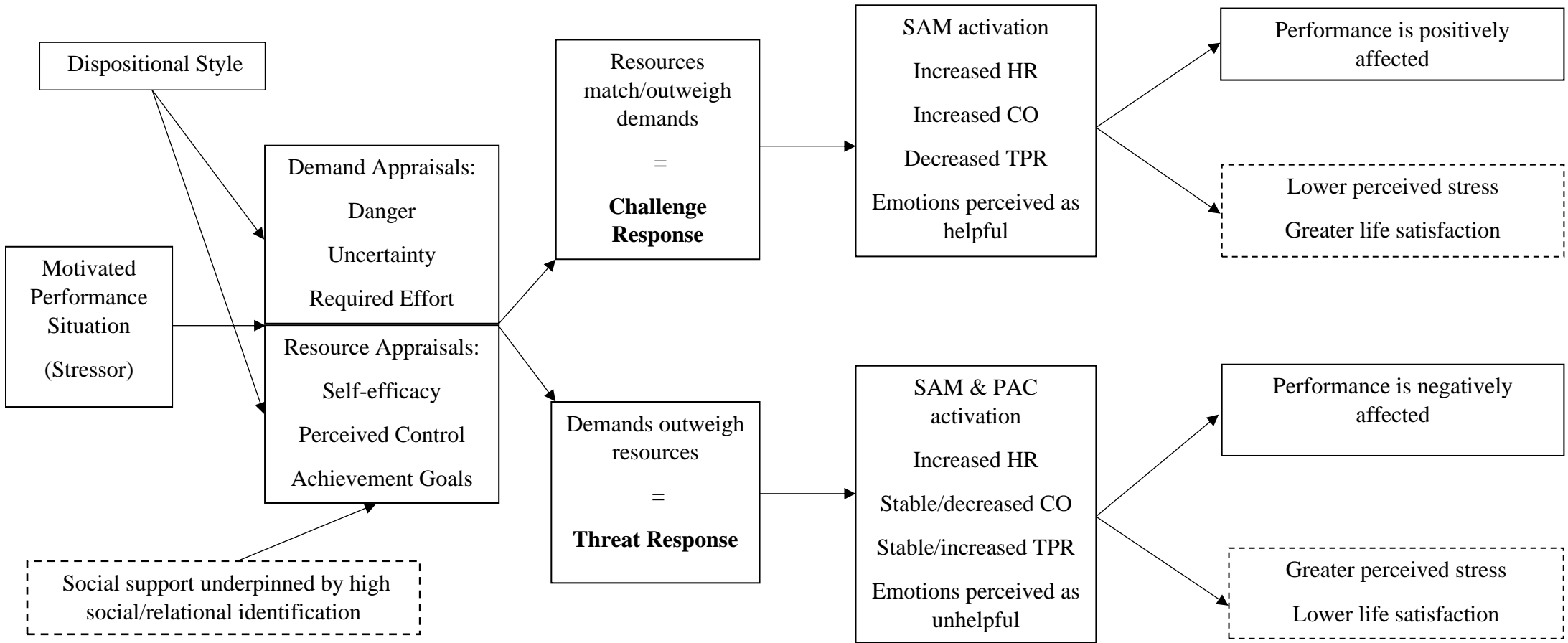
identification and social support may also lower the perceived demand appraisals as outlined in the TCTSA (perception of danger, uncertainty, and effort required), increasing the likelihood of a challenge response. To this end, it could be argued that social support and social identification may appear to be additive to, and interactive with, the three resource appraisals set out within the TCTSA (see figure 1.1). Theoretical predictions notwithstanding, the exact mechanisms of the social factors in challenge and threat are still unclear. Empirical evidence is needed to test these assumptions and proposals to ensure there is scientific advancement within this area of research, which provides a rationale for the current thesis.

There are also avenues for further exploration in terms of the physiological responses to stress, in particular CVR relating back to the appraisal process. For example, very few studies have used CVR markers associated with challenge and threat states, as outlined in the BPSM and TCTSA (i.e., CO, TPR, & PEP). Instead studies have used more simple CVR indices (i.e., BP and HR) to measure reactivity (Yuenyongchaiwat et al., 2015). Given that social support is seen to act as a stress-buffer by enhancing perceived coping resources (Uchino, 2006), it would not be surprising to see changes in CVR associated with challenge and threat states. In support of this, social support should reduce CVR in individuals who display sufficient coping resources by lowering the perceived demand (Gramer & Reitbauer, 2010). Therefore, with perceived demands and resources being central to theories such as the BPSM and TCTSA, social factors that have the potential to influence CVR measurements indicative of challenge and threat states provides a fruitful area for future research and scope for the current body of work. In short, the current thesis seeks to explore the role of social factors, namely social support, and identification with others, on challenge and threat states to better understand the human stress response.

### **1.10.1 Aims**

- 1) To examine the cross-sectional role of social support and social identification on challenge and threat cognitive appraisals, perceived stress, and life satisfaction across a range of group contexts (Chapters two and three).
- 2) To explore the influence of social support and relational identification on the resource appraisals outlined in the TCTSA (Chapters four and five).
- 3) To investigate the influence of social support, relational identification, and resource appraisals, on cardiovascular reactivity to acute stress (Chapter five).

Figure 1.1 An adapted overview of Jones' et al. (2009) TCTSA incorporating social support and social identification. Boxes with dotted lines represents how this thesis proposes to extend current theory.



Note: SAM = Sympathetic-adrenomedullary, PAC = Pituitary-adreno-cortical, CO= Cardiac output, TPR= Total peripheral resistance.

## **CHAPTER 2: THE ROLE OF SOCIAL SUPPORT AND SOCIAL IDENTIFICATION ON CHALLENGE AND THREAT COGNITIVE APPRAISALS, PERCEIVED STRESS, AND LIFE SATISFACTION IN WORKPLACE EMPLOYEES.**

### **2.1 Introduction**

Chapter one outlined theory and research concerning how stress influences psychophysiological reactivity. The preceding narrative also detailed how social factors such as social support and social identification could play a role in buffering against the deleterious effects of psychological stressors. To advance and gain a greater understanding of the role of these social factors in particular, the current chapter explores the effect of social support and social identification on individuals' challenge and threat cognitive appraisals and the influence this then has on perceived stress and life satisfaction. More specifically, to address the first aim of the thesis, the focus of the current chapter is within the occupational context where work-related stress affects 602,000 workers in Great Britain according to the latest labour force survey (LFS; Health and Safety Executive, 2019).

Stress is ubiquitous across all occupational domains and typically individuals who experience greater levels of stressors in the workplace are more likely to be unhealthy, poorly motivated and less productive (Leka, Griffiths & Cox, 2003). Workplace stress is defined by the World Health Organization as “the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope” (Leka, et al., 2003, p. 3). Stress can have maladaptive consequences to health and well-being. For example, work stress has consistently been associated with both poorer psychological and physical health, with distinct links to anxiety and depression, and physical side-effects such as migraines, injury, exhaustion, and disturbed sleep (Halbesleben & Buckley, 2004; Johnstone & Feeney, 2015; Semmer, 2004). The most recent Health and Safety Executive (HSE) report in Great Britain recorded 12.8 million

working days were lost due to work-related stress, depression or anxiety, and accounted for 44% of all work-related ill health cases in 2018/19 (Health and Safety Executive, 2019). The economic costs to the British society as a result of work-related stress is considerable, with it being estimated to be around £5.2 billion every year (Health and Safety Executive, 2016). The causes of workplace stressors can vary and be unique to a work organisation or industry, but examples include unreasonable performance demands, lack of autonomy and control over work, unclear roles, responsibility, and job insecurity (Bakker & Demerouti, 2007; Leka, et al, 2003). How an individual responds and copes with workplace stressors can be variable and not always seen as debilitating, as some work-related stress may actually increase motivation and performance (Lepine et al., 2005; Pearsall et al., 2009).

Dominant in the stress and coping literature are transactional models of stress, in which stress occurs as an interaction between the individual and the environment, influenced by both primary (i.e., identifying potential danger) and secondary (i.e., coping) appraisals (Lazarus & Folkman, 1984; Lazarus & Launier, 1978). Drawing from the appraisal theory, researchers have been interested in the human stress response in a variety of domains and within specific motivated performance situations (e.g., interviews, sporting performances, exams). For example, work stressors have been categorised into challenge and hindrance stressors (Cavanaugh et al., 2000). Challenge stressors refer to demands that need to be overcome to learn and achieve (e.g., high workload, time pressures, high levels of responsibility), whereas hindrance stressors refer to demands which are obstacles to personal growth and goal attainment (e.g., organisational politics, role ambiguity, concerns about job security) (Lepine et al., 2005). However, the exact mechanisms linking these stressors to the potential outcomes (i.e., performance, well-being) of these two pathways is unclear (Li et al., 2020). In addition, most research has relied on a-priori categorisation of a demand as either

challenge or hindrance (Searle & Auton, 2015), which some argue is oversimplistic (González-Morales & Neves, 2015) and therefore does not account for individual difference.

One established theory that provides further detail in the area of stress and coping is the biopsychosocial model of challenge and threat (BPSM; Blascovich & Mendes, 2000). The BPSM proposes that in motivated situations (e.g., interview performance), individuals make two distinct cognitive appraisals: demand and resource appraisals. The demand appraisal refers to the perception of danger, uncertainties, and required effort of the situation while the resource appraisal refers to the perceived resources and abilities to deal with the situation (e.g., skills, knowledge, abilities, and dispositional factors). Accordingly, these cognitive appraisals determine whether an individual evaluates a situation as a challenge or threat. A challenge state occurs when the perceived resources meet or exceed the perceived demands of the situation. In contrast, a threat state occurs when the perceived resources do not meet the perceived demands.

Since the formulation of the BPSM, there have been a number of theories using challenge and threat as a framework to better understand the human stress response. For example, the Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009), was developed to try and understand athletes' responses to a competition and the impact it has on performance outcomes through their cognitions, emotions, and physiological responses. Extending the BPSM by introducing three interrelated resource appraisals (self-efficacy, perceptions of control, and achievement goals), the TCTSA also outlines emotional states relating to challenge and threat by suggesting that positive emotions are typically associated with challenge, and negative emotions typically with a threat state (Jones et al., 2009). A growing body of research has adopted the BPSM and TCTSA framework to explore challenge and threat in an array of different contexts such as coping with stereotype threat (Mendes et al., 2008), classroom presentations (Zanstra et al., 2010), exams (Seery et al.,

2010), and laparoscopic surgery (Vine et al., 2013). Of particular interest to researchers are performance outcomes, and studies have shown that a challenge state is related to superior performance compared to a threat when approaching a motivated performance situation (see Behnke & Kaczmarek, 2018; Blascovich et al., 2011; Hase et al., 2018; Seery, 2011 for reviews).

Folkman and Moskowitz (2004) noted that the literature on stress and coping is dominated by individualistic approaches which have neglected the social aspects. Humans beings are social mammals and have a need to belong (Baumeister & Leary, 1995), as well as a need to be competent and autonomous (Deci & Ryan, 2000). Thus, it is necessary that social factors are considered when examining psychological stress. More recently, researchers' have recognised the importance of social factors in the transactional stress process. A key social factor that can influence how a person manages stress is an individual's perceptions of social support, which has reputed benefits to physical and psychological health (Uchino, 2009).

Social support can be defined as "support accessible to an individual through social ties to other individuals, groups, and the larger community" (Lin et al., 1979, p. 109). House (1981) outlined social support as the functional content of relationships that can be determined by four broad categories of supportive behaviours or acts. These include emotional support (i.e., empathy), instrumental or tangible support, (i.e., provision of material aid) and appraisal support (i.e., provision of information that is useful for self-evaluation). Following this, there have been a number of variants of the type of social support although Cutrona and Russell (1990) outlined the four which has received most agreement as being emotional, esteem, informational, and tangible support. Social support can also be regarded as verbal or non-verbal (i.e., nodding, smiling, eye contact) and separated into perceived and received categories. Perceived support refers to a person's potential access to supportive

resources, and is independent of the actual reception of support (Cohen & Wills, 1985), whereas, received support refers to actual support that a person receives (Haber et al., 2007; Helgeson, 1993).

Social support has been found to improve physical and psychological health (Beals et al., 2009; Cohen et al., 2000; Uchino, 2009), alongside acting as a buffer to stress (Cohen & McKay, 1984). Two key models underpin these outcomes: (1) the direct-effects (also called main effects) hypothesis which proposes that social support is beneficial all the time regardless of whether the supported person is experiencing stress or not; and (2) the buffering-effect hypothesis, which proposes social support having more of an influence on the factors related to a stressful situation (Cohen & Wills, 1985). Researchers have shown that individuals with low levels of social support have higher mortality rates, in particular from cardiovascular disease (Berkman et al., 1992), while high levels of social support have been linked with lower mortality rates from cancer (Ell et al., 1992), HIV (Lee & Rotheram-Borus, 2001), increased psychological well-being in the workplace (House, 1981), and greater life satisfaction (Kong & You, 2013). Nevertheless, these results have been seen to differ for both perceived and received support. For instance, perceived support is consistently associated with positive health outcomes (Holt-Lunstad et al., 2010; Smith et al., 2012; Uchino, 2004, 2009), while, received support has often shown inconsistent effects on health, and even negative outcomes have been found (Bolger & Amarel, 2007; Uchino, 2009).

Social support is also thought to intervene in the stress process by affecting secondary appraisal (i.e., the person's ability to cope with a stressor). For example, adequate support may lessen the impact the stress appraisal has, by providing a solution to the problem, or, by reducing the perceived importance of it (Cohen & McKay, 1984). Social support can also act as a useful resource and is apparent in various forms such as emotional support (i.e., empathy and acceptance), instrumental/tangible support, (i.e., provision of material aid) or



appraisal/informational support (i.e., provision of information that leads to alternative assessments of the stressor itself or one's ability to cope with it) (Cohen & McKay, 1984; House, 1981). A study among police officers found that the social support between co-workers significantly buffered the relationship between work-related events and distress (Patterson, 2003). Social support then is likely to increase individuals' perceptions of being able to deal successfully with stressors as they can draw upon and utilise collective actions (Skaalvik & Skaalvik, 2007). For example, talking to a co-worker about a stressful situation can act as a problem-focused coping strategy drawing upon the various forms of support.

Researchers have also suggested that social support may be a valuable resource to encourage challenge states particularly when underpinned by high social identification (Slater et al., 2016). Social identification can be defined as the extent to which an individual feels they belong to a group (e.g., an organisation, a work team, leisure group) (Haslam, 2004; Tajfel & Turner, 1979). Social Identity Theory (SIT; Tajfel & Turner, 1979) suggests that in social contexts people can define themselves as individuals (i.e., personal identity; 'I' and 'me') and as group members (i.e., social identity 'we' and 'us'). In other words, personal identity reflects an individual's perception of themselves to be distinct and different from other people in an environment, while social identity refers to "that part of an individual's self-concept which derives from his membership of a social group (or groups), together with the value and emotional significance attached to this" (Tajfel & Turner, 1979, p. 63).

Researchers have shown that greater levels of identification with an organization is positively related to a number of work-related outcomes such as job performance, motivation, turnover intentions, and absenteeism (Haslam, 2004; Riketta & Dick, 2005; Van Knippenberg, 2000). In addition, individuals who identify strongly with a certain group (e.g., their department at work) have greater overall health and well-being (Cruwys et al., 2014; Haslam et al., 2018; Jimmieson et al., 2010; Matheson & Cole, 2004; Steffens et al., 2017) and are also more

likely to experience social support from other members of that group (Avanzi et al., 2015; Branscombe et al., 1999; Bruner et al., 2020; Haslam et al., 2005; Levine et al., 2005). For example, in a study examining bomb disposal officers and bar staff, Haslam et al. (2005) found positive correlations between social identification and both social support and life/job satisfaction. Further, the relationship between social identification and stress was also mediated by social support, suggesting that social identification plays an important role for social support to achieve valuable effects to health and well-being.

Not only has social identification been seen to increase the prevalence of social support, but it has also been shown to increase the effectiveness of the support received. To illustrate, a shared social identity provides a foundation for individuals to interpret support in ways that are more beneficial and helpful to the recipient (Haslam et al., 2012; Ketturat et al., 2016). For example, Frisch et al. (2015) found that emotional social support buffered neuroendocrine stress reactions only if a shared social identity was shared between the provider and receiver. Past research evidence has shown that emotional social support is not always effective and sometimes has no impact on buffering against stressful situations (Allen et al., 1991; Anthony & O'Brien, 1999), or can be detrimental, leading to heightened stress reactions (Bolger & Amarel, 2007; Maisel & Gable, 2009). It could be the case that received support may in fact lower self-esteem, and/or draw more attention to the problem (Shrout et al., 2006). These opposite effects are sometimes referred to as “reversed buffering effect”, and research around stressful work events have shown that social support was actually related to greater distress within the workplace (Fenlason & Beehr, 1994; Kaufmann & Beehr, 1986). Thus, a shared social identity could be useful to interpret support in a more beneficial way, and prevent individuals from making such implicit criticism (e.g., feelings of inequality, threat to self-esteem) (Ketturat et al., 2016).

Currently, few studies have examined the associations between social support and social identification and made direct links to challenge and threat states (see Dixon et al., 2016; Dixon & Turner, 2018; Miller et al., 2020; Slater et al., 2018 for exceptions). Given that social support helps buffer against the deleterious effects of stress, especially when underpinned by social identification, it may be possible to witness greater challenge through the reduction of perceived demands and offering a useful resource in the face of a stressful situation. In particular, social support is also associated with an increase in psychological well-being in the workplace (House, 1981). Whereas high levels of work stress is associated with lower life satisfaction (e.g., Elangovan, 2001) and a number of other work related outcomes including intentions to quit (turnover; Webster et al., 2011), absenteeism and presenteeism (job performance; Brunner et al., 2019). Thus, gaining a better understanding of the stress response and the role of social factors is therefore of high social and economic significance.

Therefore, the aim of the current chapter is to examine the role of social support and social identification in individuals' challenge and threat cognitive appraisals and the effect this has on perceived stress and life satisfaction. Based on past research (e.g., Dixon et al., 2016; Elangovan, 2001; House, 1981; Miller et al., 2020; Slater et al., 2018; Webster et al., 2011), it is hypothesised that there would be positive relationship between social support and social identification (H1), and that greater social support and social identification would be related to greater challenge, and lower threat (H2), which in turn would be related to less stress (H3), greater life satisfaction (H4), less intentions to quit (H5), and lower absenteeism (H6), along with greater job performance (H7).

## 2.2 Method

### 2.2.1 Participants

In the current study, 412 (female = 264, male = 148) participants ( $M_{age} = 36.36$  years,  $SD_{age} = 11.19$  years) were recruited to complete an online questionnaire on one occasion. Through purposeful sampling, participants consisted of workplace employees from a range of private and public sector occupations, to capture an array of professions within the occupational context (i.e., health, education, social work, government, services, domestic services). Participants were recruited through the distribution of an online survey via social media (i.e., Twitter & Facebook), and Prolific's participant pool. Prolific is a data collection tool which allows the distribution of questionnaires to those who meet the inclusion criteria and has been considered a valuable recruitment platform for researches (Palan & Schitter, 2018). There were 549 responses to the questionnaire. Following screening for the inclusion criteria (i.e., over the age of 18, employed in the UK, informed consent provided) and data quality (i.e., incomplete measures, unrealistic completion time compared to the mean, straight-line responses), 137 respondents were removed from the dataset. This resulted in 412 eligible participants. Of these 412 participants, 152 (36.9%) were recruited via Prolific. With a power of .8 and an alpha of .05, a target sample of 114 was deemed sufficient to detect a medium effect ( $f^2 = .15$ ) for multiple regression analysis according to an apriori calculation using G\*Power.

### 2.2.2 Measures

*Appraisal of life events scale (ALE scale)*. The appraisal of life events scale (ALE-scale; Ferguson et al., 1999), was used which consists of 16 adjectives which participants were asked to rate in relation to their perceptions of their most stressful experience at work in the last three months (participants also described the event in qualitative form) on a 6-point Likert scale from 0 (*not at all*) to 5 (*very much so*). Challenge and threat can be determined

by taking the mean scores from two subscales. Cronbach's alpha for the ALE-scale in the current sample was  $\alpha = .66$  for challenge, and  $\alpha = .66$  for threat.

***Social Identification.*** The Single-Item Social Identification (SISI; Postmes, Haslam, & Jans, 2013) measure was used to assess individual's identification to their: (1) organisation and (2) colleagues. The two items asked individuals to rate how far they agree with the following statement in relation to their group i.e., "I identify with my (organisation/workplace colleagues)" on a seven-point Likert-scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). This measure has proven to capture social identification in one item and has shown high reliability and validity in past research (Postmes et al., 2013).

***Social support.*** Social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1998). This contained three subscales of different sources of support: family, friends, and significant other. Participants were asked to rate how they felt in relation to the stressful work event across twelve statements on a 7-point Likert-scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). A total social support score was created by calculating an average score for all twelve items. The MSPSS is one of the most widely used self-report measures of perceived social support and has adequate internal consistency reliability (Osman et al., 2014). Cronbach's alpha for the total social support score in the current sample was  $\alpha = .93$  demonstrating excellent internal consistency.

***Life satisfaction.*** Life satisfaction was measured using the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS; Seligson, Huebner, & Valois, 2003). This contained six items assessing satisfaction with self, family, friends, living environment, school, and global life satisfaction. Although originally intended for students under the age of 18, various studies have used the full version (Multidimensional Life Satisfaction Scale;

Huebner & Gilman, 2002) in several contexts to assess outcomes in adults (e.g., Galindez & Casas, 2011; Greenspoon & Sakloske, 1997). In addition, an evaluation of the BMSLSS revealed construct validity suitable for use in cross-sectional designs with adolescents and adults (Abubakar et al., 2015). One question was adapted to fit in line with the groups for the current study, as this was the only question that was in reference to being a student.

Therefore, this was replaced with “workplace”. A total life satisfaction score was created by averaging the scores across the six items. This measure was used across all four groups to keep consistency in measurement. Cronbach’s alpha for the total life satisfaction score from the current sample was  $\alpha = .80$ , demonstrating good internal consistency.

***Perceived stress.*** Stress was measured using the Perceived Stress Scale (PSS; Cohen et al., 1983). The ten-item measure assessed individual’s feelings and thoughts during the most stressful event identified in the last three months. Items are measured using a 5-point Likert scale 0 (*never*) to 4 (*very often*). This is a widely used psychological instrument of stress and has been well validated in a range of populations (e.g., Lee, 2012). Cronbach’s alpha for the PSS in the current sample was  $\alpha = .67$ .

***Intentions to quit.*** Turnover intention was measured using 3 items developed by (Colarelli, 1984). A sample item is “I frequently think of quitting my job.” Responses were anchored on a five-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach’s alpha for the 3-item turnover intention measure was  $\alpha = .68$ .

***Absenteeism and job performance.*** Absenteeism and job performance items were taken from The World Health Organization’s (WHO) Health and Work Performance Questionnaire (HPQ; Kessler et al., 2003). For absenteeism, participants estimated how many hours they worked over a four-week period. Specifically, participants were asked to indicate how many hours their employer expects them to work in a typical 7-day week, and then how many hours they actually worked in the past 28-days. The hours they are expected to work in

7-days are multiplied by four, and then the actual days they worked in the past 28-days are subtracted from that score to form the absolute absenteeism score. Thus, absenteeism is scored in terms of hours lost per month where higher scores indicate a greater absenteeism. For job performance, one item was taken from the HPQ (Kessler et al., 2003). The item asked participants “how would you rate your overall job performance on the days you worked during the past 4 weeks (28 days)?” on a scale from 0 (worst performance) to 10 (top performance).

### **2.2.3 Procedure**

An online survey was created using Qualtrics allowing the authors to distribute the measures to participants. Snowballing sampling was used by posting survey links on social media (i.e., Twitter & Facebook) to allow for re-sharing of the study. In addition, respondents were collected through Prolific’s participant pool as this allowed to target specific populations (i.e., workplace employees). The online survey took approximately ten minutes to complete.

### **2.2.4 Analytic strategy**

Data were examined for missing values, and little’s MCAR test revealed that across each variable between .2% and 3.1% data were missing at random,  $\chi^2 = 341.39$ ,  $df = 314$ ,  $p = .138$ . Expectation maximisation (EM) method were used to estimate the missing values (Graham, 2009) to provide a complete data set for the main analyses. Data were also examined for outliers and normality to ensure data met the assumptions for parametric testing. Significant outliers with z scores greater than two were winsorized (Salkind et al., 2010; Smith, 2014), which involved replacing extreme values to reduce the influence of outliers on the subsequent analysis. Overall, 3.21% of the data were winsorized.

Data analyses were completed in two phases. First, prior to main analysis, a series of MANOVA's and ANOVA's were conducted to assess sex differences across the variables (challenge and threat, social identification, social support, life satisfaction, perceived stress, intentions to quit, absenteeism and job performance). Second, to test H1 and H2, Pearson correlations were carried out between social support and social identification (H1), and then with challenge and threat (H2). Third, a series of hierarchical multiple regression analyses were performed to test H3 to H7. In each regression analysis, age and sex were entered at step 1, challenge and threat were entered at step 2, and social identity and social support were entered at step 3, predicting outcome variables perceived stress (H3), and life satisfaction (H4). Social identity and social support were entered in the final step to assess the additional variance added over the demographic variables and challenge and threat. Then, in a further two regression analyses, perceived stress and life satisfaction were entered into step 4, predicting outcomes intentions to quit (H5), absenteeism (H6), and performance (H7).

### 2.3 Results

Table 2.1 contains descriptive statistics and bivariate correlations coefficients between all study variables. No correlation coefficient exceeded .80 indicating that multicollinearity was not an issue in further analysis. In support of H1, a small yet significant positive correlation was found between social identification and social support (organisation:  $\beta=.10, p = .04$ , colleagues:  $\beta=.22, p < .01$ ). Partial support was found for H2, in that there was a small yet significant negative correlation between social identification with colleagues and threat ( $\beta= -.10, p =.04$ ). However, a small significant positive correlation was also found between social support and threat ( $\beta= .11, p =.02$ ) going against H2. A positive relationship between social support and social identification on challenge were revealed, but these were small and non-significant. No other significant relationships were found.

#### Sex differences across variables



There were no significant sex differences for challenge and threat Wilks'  $\Lambda = .98$ ,  $F(2, 409) = 2.40$ ,  $p = .092$ ,  $\eta^2_p = .09$ . For social identification and social support, sex differences were found Wilks'  $\Lambda = .97$ ,  $F(3, 408) = 3.57$ ,  $p = .014$ ,  $\eta^2_p = .03$ , with males reporting higher social identification with organisation, but lower identification with colleagues and social support than females. Univariate results revealed non-significant differences for social identification with organisation  $F(1,410) = 1.04$ ,  $p = .309$ ,  $\eta^2_p = .00$ , and colleagues  $F(1,410) = 1.39$ ,  $p = .238$ ,  $\eta^2_p = .00$ . There were however significant differences for social support  $F(1,410) = 6.99$ ,  $p = .008$ ,  $\eta^2_p = .02$ , with females reporting significantly higher social support compared to males ( $p = .008$ ). For perceived stress, significant differences were found  $F(1,412) = 12.81$ ,  $p > .001$ ,  $\eta^2_p = .03$ , with females reporting higher stress than males. No significant differences were found for life satisfaction  $F(1,410) = 2.49$ ,  $p = .115$ ,  $\eta^2_p = .01$ , intentions to quit  $F(1,410) = .335$ ,  $p = .552$ ,  $\eta^2_p = .00$ , absenteeism  $F(1,410) = .01$ ,  $p = .92$ ,  $\eta^2_p = .00$ , and performance  $F(1,410) = 2.08$ ,  $p = .150$ ,  $\eta^2_p = .01$ .

Table 2. 1 Means, Standard Deviations, and Bivariate Correlations for all variables (Chapter 2)

N= 412	M	SD	Scales (Cronbach's alpha)	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	36.36	11.19		-	.06	-.05	-.05	.06	.12*	-.08	-.09	-.08	-.09	.06	.11*
2. Sex	0.64	0.48			-	-.11*	.00	-.05	.06	.13**	.17**	-.08	.03	.01	.07
3. Challenge	16.48	6.79	0-5 (.66)			-	.21**	.06	.04	.05	.04	.00	-.02	-.14**	-.05
4. Threat	17.63	7.16	0-5 (.66)				-	-.06	-.10*	.11*	.30**	-.10*	.12*	-.05	-.14**
5. SI Organization	5.17	1.26	1-7					-	.48**	.10*	-.10*	.34**	-.44**	.04	.21**
6. SI Colleagues	5.63	1.21	1-7						-	.22**	-.20**	.35**	-.42**	.11*	.21**
7. Social Support	4.98	1.21	1-7 (.93)							-	.00	.37**	-.13**	.02	.01*
8. Perceived stress	21.43	5.07	0-5 (.67)								-	-.38**	.27**	-.06	-.21**
9. Life satisfaction	5.30	0.78	1-7 (.80)									-	-.36**	.10*	.27**
10. Intentions to quit	2.06	0.90	1-5 (.68)										-	-.09	-.17**
11. Absenteeism	0.23	34.53	hours											-	-.05
12. Performance	7.75	1.31	0-10												-

Note: \*  $p < .05$ , \*\*  $p < .01$ ; SI= Social Identification. Males were coded 0 and females were coded 1

### **Predicting stress**

As shown in Table 2.2, the hierarchical multiple regression for perceived stress revealed that all steps were significant in the model. When all variables were included in step three of the regression, standardised coefficients revealed only sex ( $\beta=.19, p <.001$ ), threat ( $\beta = .28, p <.001$ ), and social identification with colleagues ( $\beta= -.17, p = .002$ ) were significant predictors of perceived stress such that, being female and having greater threat, and lower identification with colleagues were related to greater perceived stress.

### **Predicting life satisfaction**

For life satisfaction, the hierarchical multiple regression revealed that sex and age at step one, and challenge and threat at step two did not explain a significant proportion of variance in life satisfaction. Adding social identity and social support at step three did explain a significant proportion of variance in life satisfaction (Table 2.2). When all variables were included in step three of the regression, standardised coefficients revealed sex ( $\beta= -.12, p = .006$ ), threat ( $\beta= -.11, p = .017$ ), social identification with organisation ( $\beta= .21, p <.001$ ), social identification with colleagues ( $\beta=.18, p <.001$ ), and social support ( $\beta= .33, p <.001$ ) were significant predictors of life satisfaction. That is, being male and having greater social identification, social support, and lower threat, were related to greater life satisfaction.

### **Predicting intentions to quit**

As shown in Table 2.3, the hierarchical multiple regression for intentions to quit revealed that sex and age at step one did not contribute significantly to the regression model, but all the other steps were significant. When all variables were included in step four of the regression, standardised coefficients revealed social identification with organisation ( $\beta= -.27, p <.001$ ), social identification with colleagues ( $\beta= -.20, p <.001$ ), perceived stress ( $\beta= .14, p = .005$ ), and life satisfaction ( $\beta= -.15, p = .006$ ), were significant predictors of intentions to quit.

That is, greater perceived stress, and lower social identification and life satisfaction, were related to greater intentions to quit.

### **Predicting absenteeism and job performance**

For absenteeism, the hierarchical multiple regression revealed that only challenge and threat at step two, and social identity and social support at step three contributed significantly to the regression model. All the other steps did not contribute significantly to the model (Table 2.3).

As shown in Table 2.3, the hierarchical multiple regression for job performance revealed that all steps were significant in the model. When all variables were included in step four of the regression, standardised coefficients revealed sex ( $\beta = .10, p = .049$ ), social identification with organisation ( $\beta = .11, p = .039$ ), perceived stress ( $\beta = -.11, p = .045$ ), and life satisfaction ( $\beta = .17, p = .004$ ), were significant predictors of job performance. That is, being female, with greater identification with the organisation and life satisfaction, along with lower perceived stress were related to greater job performance.

Table 2. 2 Hierarchical regression analyses for challenge and threat, social identity and social support, predicting perceived stress and life satisfaction

		Step 1				Step 2				Step 3			
Perceived stress													
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	
Age	-.046	.022	-.102	-.089, -.003*	-.039	.021	-.087	-.081, .002	-.032	.021	-.071	-.074, .065	
Sex	1.902	.513	.180	.893, 2.911**	1.887	.494	.178	.916, 2.857**	2.041	.494	.193	1.070, 3.012**	
Challenge					-.006	.036	-.007	-.076, .065	.003	.035	.004	-.066, .073	
Threat					.210	.034	.296	.144, .276**	.200	.034	.282	.134, .266**	
SI Organisation									.049	.212	.012	-.368, .465	
SI Colleagues									-.708	.227	-.168	-1.155, -.261*	
Social support									-.134	.201	-.032	-.528, .260	
R <sup>2</sup>	.036** ( $\Delta R^2=.041$ **)				.119** ( $\Delta R^2=.087$ **)				.142** ( $\Delta R^2=.029$ *)				
Life satisfaction													
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	
Age	-.005	.003	-.073	-.012, .002	-.005	.003	-.078	-.012, .001	-.006	.003	-.084	-.012, .000	
Sex	-.122	.080	-.075	-.280, .036	-.120	.080	-.073	-.278, .039	-.194	.070	-.119	-.332, -.055*	
Challenge					.001	.006	.010	-.010, .013	-.003	.005	-.030	-.013, .006	
Threat					-.012	.005	-.108	-.023, -.001*	-.011	.005	-.105	-.021, -.002*	
SI Organisation									.132	.030	.212	.073, .192**	
SI Colleagues									.115	.032	.177	.051, .179**	
Social support									.212	.029	.329	.156, .268**	
R <sup>2</sup>	.007 ( $\Delta R^2=.012$ )				.013* ( $\Delta R^2=.011$ )				.267** ( $\Delta R^2=.257$ **)				

Note: \*  $p < .05$ , \*\*  $p < .01$ ; Males were coded 0, and females were coded 1; SI = Social identification

Table 2. 3 Hierarchical regression analyses for challenge and threat, social identity, social support, perceived stress and life satisfaction predicting intentions to quit, absenteeism and job performance.

	Step 1				Step 2				Step 3				Step 4			
<b>Intentions to quit</b>																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Age	-.008	.004	-.094	-.015, .000	-.007	.004	-.090	-.015, .001	-.004	.004	-.049	-.011, .003	-.004	.003	-.051	-.011, .003
Sex	.070	.093	.037	-.112, .252	.060	.093	.032	-.122, .242	.077	.082	.041	-.085, .239	-.006	.082	-.003	-.167, .156
Challenge					-.006	.007	-.047	-.019, .007	-.001	.006	-.007	-.013, .011	-.002	.006	-.012	-.013, .010
Threat					.016	.006	.124	.003, .028*	.010	.006	.080	-.001, .021	.003	.006	.026	-.008, .014
SI Organisation									-.212	.035	-.294	-.281, -.142**	-.191	.035	-.265	-.260, -.121**
SI Colleagues									-.189	.038	-.252	-.264, -.115**	-.152	.038	-.203	-.227, -.078**
Social support									-.049	.033	-.066	-.115, .017	-.010	.035	-.013	-.078, .059
Perceived Stress													.024	.009	.138	.007, .041*
Life satisfaction													-.168	.061	-.146	-.288, -.049*
R <sup>2</sup>	.005 ( $\Delta R^2=.010$ )				.015*( $\Delta R^2=.015^*$ )				.244**( $\Delta R^2=.232^{**}$ )				.284**( $\Delta R^2=.042^{**}$ )			
<b>Absenteeism</b>																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Age	.175	.152	.057	-.124, .475	.154	.151	.050	-.143, .452	.123	.153	.040	-.178, .423	.145	.155	.047	-.159, .449
Sex	-.109	3.546	-.002	-7.079, 6.861	-1.128	3.539	-.016	-8.085, 5.828	-1.778	3.580	-.025	-8.816, 5.259	-1.082	3.662	-.015	-8.282, 6.118
Challenge					-.690	.255	-.136	-1.193, -.188*	-.727	.256	-.143	-1.229, -.224*	-.714	.256	-.141	-1.217, -.211*
Threat					-.111	.241	-.023	-.585, .362	-.064	.244	-.013	-.544, .416	-.024	.254	-.005	-.524, .476
SI Organisation									-.385	1.534	-.014	-3.401, 2.631	-.882	1.577	-.032	-3.982, 2.218
SI Colleagues									3.199	1.647	.112	-.038, 6.436	2.778	1.680	.097	-.525, 6.080
Social support									.409	1.453	.014	-2.447, 3.266	-.383	1.556	-.014	-3.443, 2.676
Perceived Stress													.015	.386	.002	-.744, .773
Life satisfaction													3.749	2.711	.085	-1.581, 9.079
R <sup>2</sup>	-.002 ( $\Delta R^2=.003$ )				.014*( $\Delta R^2=.020^*$ )				.018*( $\Delta R^2=.012$ )				.019( $\Delta R^2=.005$ )			
<b>Job performance</b>																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Age	.012	.006	.101	.000, .023*	.011	.006	.094	.000, .022	.009	.006	.080	-.002, .020	.010	.006	.086	-.001, .021
Sex	.177	.134	.065	-.087, .440	.174	.134	.064	-.089, .438	.150	.132	.055	-.110, .410	.262	.133	.096	.001, .522*
Challenge					-.002	.010	-.011	-.021, .017	-.006	.009	-.031	-.025, .013	-.005	.009	-.025	-.023, .013
Threat					-.024	.009	-.131	-.042, -.006*	-.021	.009	-.116	-.039, -.003*	-.012	.009	-.067	-.030, .006
SI Organisation									.154	.057	.148	.043, .265*	.118	.057	.113	.006, .230*
SI Colleagues									.111	.061	.102	-.008, .231	.059	.061	.054	-.061, .178
Social support									.082	.054	.076	-.024, .187	.018	.056	.017	-.092, .129
Perceived Stress													-.028	.014	-.109	-.056, -.001*
Life satisfaction													.282	.098	.169	.089, .475*
R <sup>2</sup>	.010* ( $\Delta R^2=.015^*$ )				.023*( $\Delta R^2=.018^*$ )				.075** ( $\Delta R^2=.058^{**}$ )				.112**( $\Delta R^2=.041^{**}$ )			

Note: \*  $p < .05$ , \*\*  $p < .01$ ; Males were coded 0 and females were coded 1; SI = Social identification

## 2.4 Discussion

The purpose of the present study was to address the first aim of the thesis by investigating the role of social support and social identification on individuals' challenge and threat states, and the effect this has on perceived stress and life satisfaction, intentions to quit, absenteeism and job performance in workplace employees.

The results from the current study showed, as hypothesised (H1) and in support of existing research, that there was a positive relationship between social identification and social support (Haslam et al., 2012; Avanzi et al., 2015). These findings suggest that individuals who have a strong connection with a particular group (e.g., their work organisation) are also more likely to perceive social support from other members of that group (Avanzi et al., 2015; Haslam et al., 2005; Levine et al., 2005). In this sense, the exchange of social support is always dependant on the relationship between the provider and recipient (Haslam et al., 2012). Thus, a shared identity is more likely perceived as originally intended rather than misconstrued as something else (Ketturat et al., 2016). It should also be noted that this finding was found when participants were responding in relation to both identification with their organisation and identification with their colleagues. Some evidence was found for H2, in that a negative relationship existed between identification with colleagues and threat, although a positive relationship was found between social support and threat. Interestingly, without an established direction of causation, this could suggest that those who are more threatened seek more support. Caution should be applied when interpreting the strength of these findings given the relatively small relationships found. Although, while larger samples increase statistical power, they tend to lead to weaker correlation coefficients which may explain these current findings (Armstrong, 2019). No other significant relationships were found in accordance with the hypotheses.

Evidence was found for H3 in that being female with greater identification with colleagues and lower threat was related to less perceived stress. These findings coincide with the sociopsychobio model (Haslam et al., 2019), which suggests social identity processes are important to help buffer against stress by altering appraisal processes, and increasing the likelihood and effectiveness of social support. Specifically, it was proposed that social identification can influence the primary appraisal by providing a common interpretive framework (e.g., Haslam & Reicher, 2006). In other words, members of a group who share common perspectives on the situation are more likely to interpret it in similar ways. For instance, those group members who have a shared identity when faced with a stressful situation change from the individual to group level, (e.g. “could this be dangerous to me?” to “could this be dangerous to us?”; Ketturat et al., 2016). In this sense, like the proverbial saying ‘a problem shared is a problem halved’, it may be possible that moving from an individual to a more group level will result in a lowering of a perceived demands and threat appraisal. Interestingly, only identification with colleagues, rather than identification with the organisation came out as a significant predictor of stress. This could be because in response to a stressful situation those members closest to the individual (i.e., colleagues) are considered more influential in helping to cope with the stressor than at organisation level. This is perhaps more pertinent in those larger organisations where the group memberships are not as salient as groups among colleagues. Past researchers have found that individuals tend to report greater levels of identification within teams and role relationships than with an organisation as a whole (Riketta & Nienaber, 2007; Sluss et al., 2012). Future researchers should look to explore the differing levels of group identification in the workplace and the effects it has on stress and challenge and threat responses.

Contrary to the hypothesis, neither social support nor challenge were significant predictors of perceived stress in the current data. The bivariate analysis also revealed no



significant relationships. It would appear that this observation goes against the buffering effect of social support on stress (Cohen & Wills, 1985). Notwithstanding, these findings highlight the variability in individual's appraisal of stressful events and that certain types of social support may not be useful in reducing perceived stress. Given that challenge and threat states are the resulting appraisal of the stressful event, these states do not advocate an increase or reduction in the perceptions of stress, which may explain why challenge did not predict perceived stress. To illustrate, an individual can still perceive high levels of stress, yet still feel they have appropriate resources to outweigh the demands and elicit a challenge state. These findings may also be explained by possibility of response bias, whereby participants tend to give more favourable answers to the items. For example, compared with females, males are more likely to report lower levels of social support due to their male role expectations (Wester et al., 2007). As such, caution should be applied when interpreting these findings given the drawbacks of self-report measures.

It was hypothesised that greater social support, social identification, challenge, and lower threat, would be related to greater life satisfaction (H4). In the present study, being male and having greater levels of social identification, social support, and lower threat, was associated with greater life satisfaction, in support of the hypothesis. These findings are consistent with previous literature which have suggested that social identification and social support can have positive effects to wider health and wellbeing outcomes including life satisfaction (Beals et al., 2009; Cohen et al., 2000; Sani et al., 2012; Uchino, 2009). It is considered that group identification can help buffer an individual from everyday stressors by creating a sense of meaning and increasing the likelihood of social support and in turn enhancing satisfaction with life (Jetten et al., 2009).

The finding that greater perceived stress, and lower social identification and life satisfaction, were related to greater intentions to quit also supported the hypothesis (H5).

Intention to quit is recognised as an important antecedent to turnover decisions and is often considered the final process (McCarthy et al., 2007). Researchers have supported the causal link between perceived stress and turnover intentions, identifying burnout as an important moderator among soccer officials (Taylor et al., 1990), paediatricians (Grossman et al., 2019) and student midwives (Eaves & Payne, 2019). Given that high turnover can lead to significant economic, organizational, and service delivery consequences (Allisey et al., 2014), these findings offer important implications for improving stress management techniques and reducing turnover intentions.

Contrary to H6, the current research found no significant predictors of absenteeism. Although support was found for H7, in that being female, along with higher identification with the organisation and greater life satisfaction, with lower perceived stress were related to greater job performance. This finding could be explained in the literature as identification is seen to motivate group members to work for the groups interests, which in turn is seen to influence performance outcomes (Van Knippenberg, 2000). In other words, instead of solely motivated to perform for themselves, there is a shift towards a more group-oriented effort and exert themselves on behalf of the group. For example, in a series of experiments van Dick et al. (2009) found that when group membership is salient, participants performed better on both brainstorming and simple motor tasks than those in the low salient conditions. It is thought that increasing the salience of an individual's group membership will reduce the effects of social loafing and increase motivation and increased performance outcomes. Although it is worthwhile noting that performance in the current study was self-rated, so other holistic measures of performance would be welcomed in future research.

A finding that emerged from the data that was not hypothesised is that females reported significantly higher social support compared to males. That is, when faced with their most stressful event in the last three months, females reported receiving greater levels of

social support than males. This is in support of past literature that suggest that females have larger social networks and are more emotionally involved in those networks accessing social support, especially in times of stress compared to males (Belle, 1991; Turner, 1994). It has also been found that males tend to maintain intimate relationships with fewer people, while women identify a greater number of individuals who they consider as important and care about (Antonucci & Akiyama, 1987). Therefore, this is an important consideration for future research and applied opportunities within this area.

Despite the current findings, the present research is not without limitations which offers ideas for future researchers. First, establishing causation or directionality with cross-sectional studies can be difficult. It could be for example, that those with a greater identification are more likely to engage in more challenging/stressful situations, or those with greater life satisfaction will have the perception of higher identification and perceived social support. Future researchers should examine these relationships with more longitudinal research designs which would enable exploration into the moderating role of the social factors between challenge and threat and perceived stress and life satisfaction. Second, caution should be applied when interpreting the results given the self-report nature of the measures due to drawbacks such as response bias (Rosenman et al., 2011). In line with this, participants were asked to recall their most stressful event over the last three months by completing the ALE-scale. Although, it is unknown the true intensity of the event or the accuracy of memory recall given that it can be impaired following stressful events (Kuhlmann & Wolf, 2006). Further, cognitive appraisal of challenge and threat can occur both consciously and unconsciously (Blascovich & Mendes, 2000) and so capturing these through self-report raises concerns. Future researchers should continue to adopt the objective cardiovascular framework of challenge and threat in more experimental designs to explore how social factors can influence challenge and threat states. Lastly, the current study did not

measure the resource appraisals within the TCTSA which would allow for a greater understanding of the influence of the social factors on the stress response.

To conclude, the present study provides some evidence to demonstrate the role that social support and social identification can have on perceived stress and related outcomes (i.e., life satisfaction, intentions to quit, & job performance). There was also some initial evidence to draw a connection to challenge and threat states which has been scant in the literature. As Haslam (2004) put it “Groups are thus a source of stress, but they can also be the key to overcoming it” (p. 191). In other words, the groups that we belong to can play an important role in how stress is appraised. To confirm the results from the current chapter, further studies need to be carried out using different population samples across other domains (i.e., sport and exercise, academia, leisure groups). To this end, the next chapter intends to further address the first aim of the thesis by examining the relationship between social support and social identification on challenge and threat, perceived stress, and life satisfaction. Here, in chapter two the aim was to explore the responses to a specific stressful event, and to build on this, the aim of chapter three is to assess individuals’ general responses to stressful situations.

## **CHAPTER 3: THE EFFECT OF SOCIAL SUPPORT AND SOCIAL IDENTIFICATION ON CHALLENGE AND THREAT STATES, PERCEIVED STRESS AND LIFE SATISFACTION.**

### **3.1 Introduction**

In the previous chapter, results showed that in response to a specific stressful situation, social support and social identification was associated with perceived stress, life satisfaction, intentions to quit, and overall job performance in workplace employees. There was also some evidence of challenge and threat cognitive appraisals being related to social support and social identification along with perceived stress and life satisfaction. The current chapter aims to build on the previous chapter and address the first aim of the thesis by examining the associations between social support, social identification, challenge and threat appraisals, perceived stress, and life satisfaction across a range of group contexts, rather than just an occupational sample. To further extend chapter two, the purpose of the current chapter is to examine the resource appraisals outlined in the TCTSA in more detail to better understand the role of the social factors in the stress response coinciding with more recent theory. Further, the present chapter aims to explore the role social factors can play in more trait stressors, to better understand individual's general response to stressful situations.

For an event to be experienced as stressful it must be appraised as such, a notion centred around Lazarus' cognitive appraisal theory (Lazarus & Folkman, 1984). More contemporary theory of stress and coping have conceptualised the transactional nature of stress within a challenge and threat framework. For example, the Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009) posits that on approach to a motivated performance situation (e.g., exam, public speaking, sporting performance), an individual evaluates perceived situational demands (demand appraisals), and perceived personal resources (resource appraisals). If the perceived resources outweigh the perceived demands, a

challenge state occurs. On the other hand, if perceived demands outweigh the perceived resources, a threat occurs. Developed from the biopsychosocial model of challenge and threat (BPSM; Blascovich & Mendes, 2000), the TCTSA extends this by introducing three interrelated resource appraisals, namely self-efficacy, perceptions of control, and achievement goals. Self-efficacy beliefs are judgements of what an individual can accomplish with his or her skills (Bandura, 1986). Perceived control refers to the beliefs the individual has about how much control is available (Jones et al., 2009). Achievement goals relate to an individual's motivation and the TCTSA adopts the 2x2 achievement goal framework that consist of mastery and performance goals associated with either goal approach or goal avoidance (Elliot & McGregor, 2001). In sum, the TCTSA puts forth that high levels of self-efficacy, perceived control, and a focus on approach goals, indicate sufficient resource appraisals on approach to a motivated performance situation, which is indicative of a challenge state. Alternatively, low levels of self-efficacy, perceived control, and a focus on avoidance goals, indicate insufficient resource appraisals on approach to a motivated performance situation, which is indicative of a threat state.

The demand appraisals comprise the perception of danger, uncertainty, and required effort. It is argued that these evaluations happen at an unconscious and automatic level, with the individual having no awareness of the appraisal process (Blascovich & Mendes, 2000; Seery, 2011). The BPSM has been revised to include the availability of support as an antecedent of challenge and threat (Blascovich, 2008), yet the exact mechanisms are unclear and warrants further examination (Moore et al., 2014). Challenge and threat theories such as the BPSM and the TCTSA have largely focused on egocentric appraisals of situational demands and resources, excluding socially derived perceptions.

There is an emerging body of literature that demonstrates that a sense of belonging and social identification is associated with a number of physical and psychological health

outcomes in a variety of different settings (Haslam et al., 2018; Sani et al., 2012). Central to this notion is the Social Identity Theory (SIT; Tajfel & Turner, 1979) and Self-Categorisation Theory (Turner et al., 1987) which suggests that the groups we belong to define who we are (Tajfel & Turner, 1979; Turner et al., 1987), and the way in which an individual thinks and behaves are coherent with their personal or social identity. For example, when individuals perceive to have a meaningful attachment to a group, their thought processes and actions adapt to their social identity (Adarves-Yorno et al., 2006). Researchers have shown that the greater number of groups an individual identifies with is typically associated with better health and well-being outcomes (Sani et al., 2015).

More recently, there has been a focus on the role of group memberships and associated identities in influencing the psychology and biology of stress. For instance, within the sociopsychobio model (Haslam et al., 2019), social identity processes are key and can be seen to buffer against stress in three ways: 1) social identity alters appraisal processes, 2) social identity increases social support, and 3) social identity increases the effectiveness of social support (Haslam, Jetten, Postmes, et al., 2009). Much of the stress and coping literature has been built from the transactional model which argues that stress is the interaction between individual and environment (Lazarus & Folkman, 1984). It has been suggested that a shared social identity can influence the appraisal process by providing a common interpretive framework (e.g., Haslam & Reicher, 2006). For example, members of the group share common perspectives on the situation and interpret it in similar ways. Scholars have suggested that social identity can shift the appraisal process from the individual to group level (Ketturat et al., 2016). As a result, when coping with a stressor, the resources from the group are taken into account within the individual appraisal process (Haslam et al., 2004, 2005). An example of this could be seen from the perceptions of social support.

Individuals who identify strongly with a certain group (e.g., within an organisation) are also more likely to experience social support from other members of that group (Avanzi et al., 2015; Branscombe et al., 1999; Haslam et al., 2005; Chapter two). In other words, individuals are more likely to offer help to people they perceive as belonging to the in-group, and equally, they are more likely to receive help from others who perceive them as belonging to the same in-group (Levine et al., 2005). Social support is an effective resource in the face of stressors and can come in a number of forms; emotional support (i.e., empathy & acceptance), instrumental/tangible support, (i.e., provision of material aid) or appraisal/informational support (i.e., provision of information that leads to alternative assessments of the stressor itself or one's ability to cope with it; Cohen & McKay, 1984; House, 1981). Additionally, having multiple group memberships means one is likely to have access to more sources of social support (Haslam et al., 2008).

Not only does having a shared social identity increase the possibility of social support, but it has been shown to increase the effectiveness of the support received. This is largely down to the idea that a shared social identity provides a basis for individuals to interpret support in ways that are more beneficial (Haslam et al., 2012; Ketturat et al., 2016). For example, Frisch et al. (2015) found that emotional social support buffered neuroendocrine stress reactions only if a shared social identity was shared between the provider and receiver. Thus, a shared social identity can be useful to interpret support in a more beneficial way, and prevent individuals from making misinterpretations towards implicit criticism (e.g., feelings of inequality, threat to self-esteem) (Bolger et al., 2000; Ketturat et al., 2016). In another study, Haslam et al. (2005) found relationships between social identification and lower stress and greater satisfaction, which was mediated by social support. This suggests that social identification is a key variable for social support to achieve beneficial effects to health and well-being.



Despite the reported benefits of social identification and social support outlined above, the stress and coping literature tends to be individualistically focused, omitting the potential explanatory power of the social relationships and groups (Folkman & Moskowitz, 2004). To capture and enhance the understanding of the human stress response, it is important to explore the psychological process involved in group functioning. Even though social support is clearly important for the stress response, challenge and threat researchers have rarely acknowledged or examined the potential effects that social factors, such as perceptions of social support and social identification, can have on an individual's challenge and threat responses to a motivated performance situation. For example, it has been suggested that if supported with perceptions of social identification, social support could be a valuable resource appraisal on approach to a stressful situation (Freeman & Rees, 2009; Hartley & Coffee, 2019; Slater et al., 2016, 2018). Thus, it could be plausible to suggest that these social factors could be additive and interactive with the three interrelated resource appraisals proposed in the TCTSA (self-efficacy, perceptions of control, and achievement goals).

Therefore, the current chapter aims to initially explore the relationships between both challenge resource appraisals and social factors on individuals' responses to stress. Specifically, examining the associations between social support, social identification, challenge and threat appraisals, perceived stress, and life satisfaction across a range of group contexts. This builds from chapter two and extends knowledge by providing evidence concerning the associations between social support and social identification on the resource appraisals outlined in the TCTSA. Based on previous research and results from chapter two, it was hypothesized that there would be positive relationship between social support and social identification (H1), and that greater social support and social identification would be related to greater self-efficacy, control, approach goals, challenge, and lower threat and

avoidance goals (H2), which in turn would be related to less stress (H3) and greater life satisfaction (H4).

## 3.2 Method

### 3.2.1 Participants

A total of 480 (female = 275, male = 205) participants ( $M_{\text{age}} = 32.01$ ,  $SD_{\text{age}} = 10.02$  years) took part in the study. The participants represented four groups: (1) university students ( $n = 110$ ); (2) workplace employees ( $n = 126$ ); (3) team sport athletes ( $n = 116$ ); and (4) group exercisers ( $n = 128$ ). These groups were targeted through purposeful sampling due to their typical group environments and access to various social interactions and exchanges. Participants were recruited through the distribution of an online survey via social media (i.e., Twitter & Facebook), and Survio's consumer panel (Survio, 2016). Survio is a data collection tool which allows the distribution of questionnaires to those who meet the inclusion criteria and has been used in past research (e.g., Fontes et al., 2019). There were 557 responses to the questionnaire. Following screening for the inclusion criteria (i.e., over the age of 18, identified to one of the four groups, informed consent provided) and data quality (i.e., incomplete measures, unrealistic completion time compared to the mean, straight-line responses), 77 respondents were removed from the dataset. This resulted in 480 eligible participants. Of these 480 participants, 341 (71.0%) were recruited via Survio. Participants were also told by completing the survey that they would be entered into a prize draw to win up to £50. With a power of .80 and an alpha of .05, a target sample of 395 was deemed sufficient to detect a small effect ( $f^2 = .02$ ) according to an apriori calculation using G\*Power for multiple regression analysis.

### 3.2.2 Measures

**Social factors.** The Single-Item Social Identification (SISI: Postmes et al., 2013) measure was used to assess individual's identification to the group. The question asked

individuals to rate how far they agree with the following statement in relation to their group i.e., “I identify with my (academic course / workplace / team / or exercise class)” on a seven-point Likert-scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*).

Social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1998). This contained three subscales of different sources of support: family, friends, and significant other. Participants were asked to rate how they feel about twelve statements on a 7-point Likert-scale ranging from 1 (*very strongly disagree*) to 7 (*very strongly agree*). A total social support score was created by calculating an average score for all twelve items. The MSPSS is one of the most widely used self-report measures of perceived social support and has adequate internal consistency reliability (Osman et al., 2014). Cronbach’s alpha for the total social support score in the current sample was  $\alpha = .92$ , demonstrating excellent internal consistency.

**Resource appraisals.** Perceived control was measured by asking individuals to indicate to what extent they agreed or disagreed with the following statement: “As a student/workplace employee/athlete/group exerciser, I feel I have control over my skills” on a 5-point scale, ranging from 0 (*not at all*) to 4 (*extremely*). This measure was based on a control item used in Meijen et al. (2014).

A shortened version of The Achievement Goals Questionnaire (AGQ; Conroy et al., 2003) was used which measures mastery approach goals (MAp), mastery avoidance goals (MAv), performance approach goals (PAp), and performance avoidance goals (PAv). Originally 12 items, participants were asked four questions (one item for each subscale) relating to general tasks related to their group on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (*very true*). An approach score was created by taking the mean scores from MAp and PAp, and an avoidance score were created by taking the mean scores from MAv

and PAV. This shortened measure has also used in previous research (e.g., Turner et al., 2013).

The General Self-Efficacy Scale (GSE: Schwarzer & Jerusalem, 1995) measured the belief that an individual can perform a novel or difficult task, or cope with adversity in various domains of human functioning. A total of fourteen questions were rated on a 4-point Likert-Scale ranging from 1 (*not at all true*) to 4 (*exactly true*). This measure has been used internationally and has high reliability and has been shown to have construct validity in numerous studies (Luszczynska et al., 2005). Cronbach's alpha for the GSE in the current sample was  $\alpha = .86$ , demonstrating good internal consistency.

***Challenge and threat.*** The Cognitive Appraisal Scale (CAS: Skinner & Brewer, 2002) measured challenge and threat appraisals across eighteen items based on Lazarus and Folkman's (1984) concept. All items are rated on a 6-point Likert-scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Cronbach's alpha for the CAS subscales in the current sample was challenge  $\alpha = .85$ , which demonstrates good consistency, and threat  $\alpha = .93$ , demonstrating excellent internal consistency.

***Perceived stress.*** Stress was measured using the Perceived Stress Scale (PSS: Cohen et al., 1983). The ten-item measure assessed individual's feelings and thoughts during the last month. Items are measured using a 5-point Likert scale 0 (*never*) to 4 (*very often*). This is a widely used psychological instrument of stress and has been well validated in a range of populations (e.g., Lee, 2012). Cronbach's alpha for the PSS in the current sample was  $\alpha = .73$ , demonstrating acceptable internal consistency.

***Life satisfaction.*** Life satisfaction was measured using the Brief Multidimensional Students' Life Satisfaction Scale (BMSLSS: Seligson et al., 2003). This contained six items assessing satisfaction with self, family, friends, living environment, school, and global life satisfaction. One question was adapted to fit in line with the groups for the current study, as

this was the only question that was in reference to a student. This was replaced with either workplace, team, exercise class. A total life satisfaction score was created by averaging the scores across the six items. Cronbach's alpha in the current sample was  $\alpha = .85$ , demonstrating good internal consistency.

### **3.2.3 Procedure**

An online survey was created using Qualtrics. Survio and social media (i.e., Twitter & Facebook) was used to distribute the measures to participants through a purposive and snowballing sampling effect. Survio's consumer panel was utilized as this allowed to target specific populations and social media allowed for re-sharing of the study. The online survey took no longer than ten minutes to complete.

### **3.2.4 Analytic strategy**

Data were first examined for outliers and normality to ensure data met the assumptions for parametric testing. Significant outliers with  $z$  scores greater than two were winsorized (Salkind et al., 2010; Smith, 2014). This is a process in which extreme values are replaced to reduce the influence of outliers on the data. Overall, 5.13% of the data were winsorized. Data analyses were completed in three phases to test H1, H2, H3 and H4. First, to test H1 and H2, Pearson correlations were carried out between social support and social identification (H1), and how these relate with resource appraisals and challenge and threat (H2). Second, prior to main analysis, three MANOVA's were carried out to examine differences between groups (university students, workplace employees, team sport athletes, and group exercisers) and sex, across (i) resource appraisals; (ii) challenge and threat; and (iii) social identification and social support. Third, a five-step multiple hierarchical regression was conducted with perceived stress as the outcome variable (H3). Group was entered at step one of regression, age and sex were entered at step two, the resource appraisals (control, approach goals, avoidance goals, self-efficacy) were entered at step three, challenge and

threat entered at step four, and social identity and social support entered at step five. Then a six-step multiple regression was conducted with life satisfaction as the outcome variable (H4), which followed the previous model but added perceived stress in step 6.

### 3.3 Results

Table 3.1 contains descriptive statistics and bivariate correlations coefficients between all study variables. No correlation coefficient exceeded .80 indicating that multicollinearity was not an issue in further analysis. In support of H1, a moderate positive correlation was found between social identification and social support ( $\beta = .37, p < .01$ ). In support of H2, a small to moderate positive correlation was found for both social support and social identification on self-efficacy (social support:  $\beta = .30, p < .01$ , social identification:  $\beta = .38, p < .01$ ), control (social support:  $\beta = .25, p < .01$ , social identification:  $\beta = .30, p < .01$ ), approach (social support:  $\beta = .22, p < .01$ , social identification:  $\beta = .38, p < .01$ ), and challenge (social support:  $\beta = .41, p < .01$ , social identification:  $\beta = .29, p < .01$ ). Whereas a small, negative correlation was found for threat (social support:  $\beta = -.11, p = .02$ , social identification:  $\beta = -.10, p = .03$ ). For avoidance, no significant relationships were found.

#### Differences between groups and sex

Table 3.2 displays results of the MANOVA's conducted. For resource appraisals, group differences were found for avoidance ( $p < .001$ ), and self-efficacy ( $p = .002$ ). Pairwise comparisons revealed that athletes reported significantly higher avoidance goals compared to workplace employees ( $p = .014$ ). Students also reported significantly higher avoidance goals compared to group exercisers ( $p = .022$ ) and workplace employees ( $p = .004$ ). For self-efficacy, athletes ( $p = .003$ ) and group exercises ( $p = .006$ ) reported significantly higher self-efficacy compared to students.

For challenge and threat appraisals, group differences were found only for threat ( $p = .004$ ). Pairwise comparisons revealed that students reported significantly higher threat scores

compared to athletes ( $p = .008$ ), group exercisers ( $p = .011$ ) and workplace employees ( $p = .031$ ). There were also significant sex differences for challenge ( $p = .005$ ), with females reporting significantly higher challenge scores compared to males ( $p = .005$ ).

Group differences were also found for social identification ( $p < .001$ ), and social support ( $p < .001$ ). Pairwise comparisons revealed that athletes reported significantly higher social identification compared to workplace ( $p < .001$ ). For social support, athletes ( $p < .001$ ), group exercisers ( $p < .001$ ), and workplace employees ( $p = .032$ ), reported significantly higher social support compared to students. There were also significant sex differences for social support ( $p < .001$ ), with females reporting significantly higher social support compared to males ( $p < .001$ ). No other comparisons or main effects were significant.

### **Predicting stress and life satisfaction**

As shown in Table 3.3 the hierarchical multiple regression for perceived stress revealed that all steps were significant in the model. When all variables were included in step five of the regression, standardised coefficients revealed avoidance goals ( $\beta = .17, p = .004$ ), self-efficacy ( $\beta = -.11, p = .029$ ), challenge ( $\beta = .14, p = .01$ ), and threat ( $\beta = .31, p < .001$ ), were significant predictors of perceived stress, such that greater avoidance goals, challenge, threat, and lower self-efficacy were related to greater stress.

For life satisfaction, the hierarchical multiple regression revealed that all steps were significant in the model (Table 3.4). When all variables were included in step six of the regression, standardised coefficients revealed control ( $\beta = .10, p = .007$ ), approach goals ( $\beta = -.11, p = .013$ ), self-efficacy ( $\beta = .09, p = .029$ ), threat ( $\beta = -.11, p = .015$ ), social identification ( $\beta = .15, p < .001$ ), social support ( $\beta = .47, p < .001$ ) and perceived stress ( $\beta = -.15, p < .001$ ), were significant predictors of life satisfaction. That is, greater control, social identification, social support, and lower approach goals, threat, and perceived stress, were related to greater life satisfaction.

Table 3.1 Means, Standard Deviations, and Bivariate Correlations for all variables

N= 480	M	SD	Scales (Cronbach's alpha)	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Group	2.51	1.12		-	-.03	.07	-.07	.01	-.09*	-.12**	.04	.07	-.19**	-.14**	.17**	-.15**
2. Age	32.01	10.02			-	-.03	.11*	-.06	-.28**	.18**	.07	-.27**	.06	.16**	-.14**	.12*
3. Sex	.57	.49				-	-.04	.05	.05	-.08	.13**	.10*	.00	.13**	.13*	-.03
4. Control	3.88	.73	1-5				-	.27**	-.06	.36**	.31**	-.19**	.30**	.25**	-.18**	.33**
5. Approach	5.35	.95	1-7					-	.51**	.23**	.22**	.11*	.38**	.22**	-.01	.13**
6. Avoidance	4.62	1.34	1-7						-	-.08*	-.09*	.53**	.09	.00	.27**	-.11*
7. Self- efficacy	30.65	3.64	1-4 (.86)							-	.48**	-.31**	.38**	.30**	-.25**	.40**
8. Challenge	4.63	.74	1-6 (.85)								-	-.03	.29**	.41**	-.01	.35**
9. Threat	3.90	1.11	1-6 (.93)									-	-.10*	-.11*	.46**	-.28**
10. Social Identity	5.34	1.17	1-7										-	.37**	-.17**	.41**
11. Social Support	5.30	1.10	1-7 (.92)											-	-.15**	.61**
12. Perceived stress	17.84	5.05	0-4 (.73)												-	-.32**
13. Life satisfaction	5.21	.93	1-7 (.85)													-

Note: \*  $p < .05$ , \*\*  $p < .01$ . Males were coded 0, and females were coded 1.



Table 3.2 MANOVA and univariate ANOVA results for between groups and sex differences

Variable	Athlete		Group Exercisers		Student		Workplace		Totals		ANOVA	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Resource Appraisals												
Control	Male	4.03	.74	3.92	.75	3.82	.80	3.81	.79	3.91	.77	Group: $F(3, 471) = 1.97, p = .118, \eta^2_p = .01$ Sex: $F(1, 471) = .35, p = .555, \eta^2_p = .01$ Group x Sex: $F(3, 471) = 1.18, p = .318, \eta^2_p = .007$
	Female	3.89	.64	3.95	.68	3.64	.74	3.94	.67	3.85	.70	
	Total	3.97	.70	3.94	.71	3.70	.76	3.88	.73	3.87	.73	
Approach	Male	5.44	.93	5.04	.89	5.28	.94	5.40	1.01	5.30	.95	Group: $F(3, 471) = .71, p = .545, \eta^2_p = .01$ Sex: $F(1, 471) = 1.16, p = .283, \eta^2_p = .002$ Group x Sex: $F(3, 471) = 1.71, p = .164, \eta^2_p = .01$
	Female	5.32	.99	5.42	.85	5.46	1.08	5.35	.85	5.39	.94	
	Total	5.38	.95	5.27	.88	5.40	1.04	5.37	.92	5.35	.95	
Avoidance	Male	4.80	1.23	4.35	1.12	4.75	1.26	4.33	1.49	4.55	1.30	Group: $F(3, 471) = 6.08, p < .001, \eta^2_p = .04$ Sex: $F(1, 471) = 1.83, p = .304, \eta^2_p = .002$ Group x Sex: $F(3, 471) = .41, p = .743, \eta^2_p = .003$
	Female	4.88	1.23	4.46	1.28	5.11	1.34	4.30	1.46	4.68	1.37	
	Total	4.84	1.23	4.41	1.22	5.00	1.32	4.32	1.47	4.63	1.34	
Self-efficacy	Male	31.46	3.43	31.34	3.43	30.15	3.97	30.63	3.76	30.98	3.63	Group: $F(3, 471) = 4.99, p = .002, \eta^2_p = .03$ Sex: $F(1, 471) = 1.55, p = .214, \eta^2_p = .003$ Group x Sex: $F(3, 471) = .50, p = .683, \eta^2_p = .003$
	Female	31.15	3.58	31.08	3.75	29.01	3.38	30.66	3.41	30.42	3.63	
	Total	31.32	3.49	31.18	3.62	29.36	3.59	30.65	3.56	30.66	3.63	
MANOVA												
Group: Wilks' Lambda = .92, $\eta^2_p = .03, F(12, 1238) = 3.53, p < .001$ .												
Sex: Wilks' Lambda = .99, $\eta^2_p = .001, F(4, 468) = .96, p = .43$												
Group x Sex: Wilks' Lambda = .97, $\eta^2_p = .009, F(12, 1238) = 1.03, p = .42$												
Challenge and Threat Appraisals												
Challenge	Male	4.57	.76	4.43	.64	4.53	.69	4.57	.75	4.53	.72	Group: $F(3, 471) = 1.44, p = .231, \eta^2_p = .009$ Sex: $F(1, 471) = 8.00, p = .005, \eta^2_p = .02$ Group x Sex: $F(3, 471) = 1.24, p = .295, \eta^2_p = .008$
	Female	4.70	.77	4.75	.73	4.53	.74	4.89	.70	4.71	.74	
	Total	4.63	.77	4.63	.71	4.53	.72	4.74	.74	4.63	.74	
Threat	Male	3.68	1.10	3.67	1.06	3.98	.98	3.70	1.30	3.73	1.13	Group: $F(3, 471) = 4.46, p = .004, \eta^2_p = .03$ Sex: $F(1, 471) = 3.30, p = .070, \eta^2_p = .007$ Group x Sex: $F(3, 471) = .55, p = .645, \eta^2_p = .004$
	Female	3.74	1.01	3.78	1.17	4.41	.90	3.85	1.14	3.96	1.09	
	Total	3.70	1.06	3.74	1.12	4.28	.94	3.78	1.21	3.86	1.11	
MANOVA												
Group: Wilks' Lambda = .96, $\eta^2_p = .18, F(6, 940) = 2.90, p = .008$												
Sex: Wilks' Lambda = .98, $\eta^2_p = .02, F(2, 470) = 5.75, p = .003$ .												
Group x Sex: Wilks' Lambda = .99, $\eta^2_p = .01, F(6, 940) = .88, p = .507$												
Social Factors												
Social identification	Male	5.71	1.11	5.36	1.16	5.35	1.10	4.93	1.28	5.35	1.20	Group: $F(3, 471) = 6.52, p < .001, \eta^2_p = .04$ Sex: $F(1, 471) = .03, p = .855, \eta^2_p < .001$ Group x Sex: $F(3, 471) = .39, p = .758, \eta^2_p = .002$
	Female	5.68	1.03	5.31	1.17	5.30	1.24	5.15	1.05	5.34	1.15	
	Total	5.70	1.07	5.33	1.16	5.32	1.20	5.05	1.16	5.34	1.17	
Social support	Male	5.45	1.03	5.20	1.00	4.76	1.14	4.97	1.05	5.14	1.07	Group: $F(3, 471) = 8.51, p < .001, \eta^2_p = .05$ Sex: $F(1, 471) = 11.98, p = .001, \eta^2_p = .03$ Group x Sex: $F(3, 471) = .87, p = .457, \eta^2_p = .006$
	Female	5.67	1.10	5.61	.98	4.94	1.05	5.55	1.14	5.42	1.10	
	Total	5.55	1.07	5.45	1.00	4.89	1.07	5.28	1.13	5.30	1.09	
MANOVA												
Group: Wilks' Lambda = .92, $\eta^2_p = .04, F(6, 940) = 7.16, p < .001$												
Sex: Wilks' Lambda = .97, $\eta^2_p = .03, F(2, 470) = 6.63, p = .001$												
Group x Sex: Wilks' Lambda = .99, $\eta^2_p = .003, F(6, 940) = .52, p = .790$												

Table 3.3 Hierarchical regression analyses for resource appraisals, challenge and threat, social identity, and social support, predicting perceived stress

Variable	Step 1				Step 2				Step 3				Step 4				Step 5			
	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Group	.764	.203	.170	.365, 1.163**	.707	.201	.157	.313, 1.101**	.777	.191	.173	.401, 1.153**	.613	.183	.136	.252, .973**	.517	.187	.115	.149, .885*
Age					-.068	.022	-.136	-.112, -.024**	-.010	.022	-.020	-.054, .033	.005	.021	.010	-.036, .047	.010	.021	.020	-.032, .052
Sex					1.209	.455	.119	.316, 2.102**	1.005	.427	.099	.165, 1.845*	.650	.414	.064	-.163, 1.463	.737	.415	.072	-.078, 1.553
Control									-.332	.324	-.048	-.969, .306	-3.56	.313	-.051	-.970, 2.59	-.271	.313	-.039	-.887, .345
Approach									-.808	.285	-.152	-1.368, -.249**	-.667	.227	-.125	-1.210, -.124*	-.519	.286	-.097	-1.080, .043
Avoidance									1.276	.199	.338	.886, 1.667**	.651	.223	.173	.213, 1.089**	.651	.222	.173	.215, 1.088*
Self-efficacy									-.200	.065	-.144	-.328, -.072**	-.175	.071	-.126	-.313, -.036*	-.156	.071	-.112	-.296, -.016*
Challenge													.718	.335	.105	.060, 1.376*	.942	.349	.137	.255, 1.628*
Threat													1.456	.235	.321	.994, 1.918**	1.421	.235	.313	.959, 1.882**
Social identity																	-.261	.204	-.060	-.661, .139
Social support																	-.370	.214	-.080	-.791, .051
R <sup>2</sup>	.027** ( $\Delta R^2=.029^{**}$ )				.056** ( $\Delta R^2=.033^{**}$ )				.173** ( $\Delta R^2=.123^{**}$ )				.252** ( $\Delta R^2=.081^{**}$ )				.258** ( $\Delta R^2=.009^*$ )			

Note. \*  $p < .05$ , \*\*  $p < .01$ . Males were coded 0, and females were coded 1.

Table 3.4 Hierarchical regression analyses for resource appraisals, challenge and threat, social identity, social support and perceived stress predicting life satisfaction.

Variable	Step 1				Step 2				Step 3				Step 4				Step 5				Step 6			
	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Group	-.117	.037	-.141	-.190, -.043**	-.113	.037	-.136	-.186, -.039**	-.087	.034	-.106	-.155, -.020*	-.085	.34	-.103	-.152, -.019*	-.007	.029	-.009	-.064, .050	.007	.029	.008	-.050, .064
Age					.011	.004	.116	.003, .019*	.001	.004	.016	-.006, .009	.001	.004	.009	-.007, .009	-.004	.003	-.046	-.011, .002	-.004	.003	-.043	-.010, .002
Sex					-.034	.085	-.018	-.200, .132	.017	.077	.009	-.134, .168	-.026	.076	-.014	-.175, .123	-.121	.064	-.065	-.248, .005	-.101	.064	-.054	-.226, .024
Control									.253	.058	.198	.138, .367**	.206	.057	.162	.093, .319**	.138	.049	.108	.043, .233*	.131	.048	.103	0.37, .225*
Approach									.064	.051	.066	-.036, .165	.009	.051	.010	-.090, .109	-.095	.044	-.097	-.182, -.008*	-.109	.044	-.112	-.195, -.023*
Avoidance									-.084	.036	-.121	-.154, -.014*	.014	.041	.020	-.066, .095	.008	.034	.012	-.059, .076	.026	.034	.038	-.041, .093
Self-efficacy									.073	.012	.285	.050, .096**	.040	.013	.157	.014, .065**	.028	.011	.111	.007, .050*	.024	.011	.094	.003, .045*
Challenge													.276	.062	.219	.155, .367**	.053	.054	.042	-.053, .159	.079	.054	.063	-.027, .184
Threat													-.164	.043	-.197	-.249, -.079**	-.130	.036	-.156	-.201, -.058**	-.091	.037	-.109	-.164, -.018*
Social identity																	.130	.032	.163	0.68, .192**	.122	.031	.154	.061, .184**
Social support																	.411	.033	.485	.346, .476**	.401	.033	.473	.336, .465**
Perceived stress																					-.027	.007	-.149	-.041, -.014**
R <sup>2</sup>	.018** ( $\Delta R^2 = .020$ **)				.028** ( $\Delta R^2 = .014$ *)				.208** ( $\Delta R^2 = .185$ **)				.249** ( $\Delta R^2 = .044$ **)				.471** ( $\Delta R^2 = .220$ **)				.486** ( $\Delta R^2 = .016$ **)			

Note. \*  $p < .05$ , \*\*  $p < .01$ . Males were coded 0, and females were coded 1.

### 3.4 Discussion

The aim of the current chapter was to address the first aim of the thesis by examining the associations between social support, social identification, challenge and threat appraisals, perceived stress, and life satisfaction across a range of group contexts. This builds on chapter two by focusing on the resource appraisals outlined in the TCTSA specifically to further understand the role of the social factors in the stress response. Adopting a cross-sectional multivariate design across a number of groups, atemporal associations found a positive relationship between social support and social identification in support of H1. Significant associations were also found in line with H2, with both social support and social identification being positively related with self-efficacy, control, approach, and challenge, and negatively related with threat. No significant correlations were found for avoidance. Results also revealed partial support for H3 in that avoidance and challenge and threat were positively associated, while self-efficacy was negatively associated, with perceived stress. Further, there was further some support for H4 in that control, self-efficacy, social identification, and social support were positively associated, while approach, threat, and perceived stress were negatively associated with life satisfaction. Finally, between groups differences revealed students reported higher avoidance, higher threat, lower self-efficacy, and lower social support scores, compared with the other groups. Females also reported higher challenge and social support scores compared with males.

A positive relationship between social support and social identification was found similar to past research (e.g., Haslam et al., 2012; Avanzi et al., 2015) and chapter two. This is in support of the notion that individuals who identify strongly with a certain group (e.g., their work organisation) are also more likely to perceive social support from other members of that group (Avanzi et al., 2015; Haslam et al., 2005; Levine et al., 2005). Furthermore, it has been argued that the provision of social support is always dependant on the relationship

between the provider and recipient (Haslam et al., 2012). Slater et al. (2016) also suggested that social support may be a valuable resource to encourage challenge states particularly when underpinned by high social identification. This coincides with the current findings as social support and social identification were positivity associated with challenge and negatively associated to threat. In addition, both social support and social identification were positively associated with the resource appraisals outlined within the TCTSA (self-efficacy, control, approach goals). As such, these novel findings provide evidence to suggest that the social factors could be considered additive and interactive with the three interrelated resource appraisals proposed in the TCTSA. In other words, having greater social identification and social support is more likely to lead to greater perceptions of self-efficacy, control, and approach goal focus toward a stressful situation. Therefore, the interplay between social identification and social support is important to establish more adaptive outcomes to stress. It is worth noting that given the small to moderate relationships found, caution should be applied when interpreting the strength of these findings.

The results from the current chapter also revealed that avoidance and challenge and threat were positively associated, while self-efficacy were negatively associated with perceived stress. The TCTSA posits that avoidance goals reflect a drive to avoid incompetence and is seen as maladaptive and more likely to result in a threat state (Jones et al., 2009). It could be that avoidance goals are also likely to increase perceptions of stress in an individual, and researchers have shown avoidance-based coping strategies to increase stress compared with active strategies (e.g., Chao, 2011). Further, avoidance goals have been linked with less perceived control which has also been positively associated with increased perceived stress and well-being (Dijkstra & Homan, 2016). It is not surprising to see positive relationships between challenge and threat and perceived stress in the current findings. Challenge and threat theory does not suggest an absence or reductions of perceived stress in

the face of a motivated performance situation, rather these two states (i.e., challenge & threat) are simply the resultant appraisal of the stressful situation predicting adaptive or maladaptive responses. In other words, an individual can still perceive high levels of stress on approach to a motivated performance situation and still feel they have appropriate resources to outweigh the demands and elicit a challenge state.

The finding that self-efficacy was negatively associated with perceived stress is in support of previous research (e.g., Coffman & Gilligan, 2002; Naga Shilpa & Prasad, 2017). Individuals with high levels of self-efficacy tend to use more active problem- focused coping, as opposed to those with low levels of self-efficacy who tend to apply more passive emotional coping (Luszczynska et al., 2005). In a meta-analysis, self-efficacy has also been considered a moderating variable in perceived stress and protection from burnout (Shoji et al., 2016). Self-efficacy is an important resource appraisal outlined in the TCTSA and refers to the belief that one has the skills necessary to execute the courses of action required to succeed, which contributes to the perception that they can cope with the demands of the situation (Jones et al., 2009). While self-efficacy is usually defined as context specific, it may also be conceptualised and measured in a more general way (Luszczynska et al., 2005), as seen within the current research. As such, self-efficacy is considered a valuable resource in the face of a variety of stressful encounters across different domains. Contrary to predictions and past research, there was no significant relationships between the social factors (i.e., social identification and social support) in predicting perceived stress in the current findings. Although there were significant negative bivariate correlations, it could be that other variables (i.e., self-efficacy) were stronger predictors of perceived stress. This observation could also suggest that social identification and social support exerts its beneficial effects by strengthening other resource appraisals, which is supported in past research (Gallagher et al.,

2014; Rees & Freeman, 2009b; Slater et al., 2016, 2018). These findings are also similar to those in chapter two in that social support was not a significant predictor of perceived stress.

With regards to predicting life satisfaction, control, self-efficacy, social identification, and social support were positively associated, while approach, threat, and perceived stress were negatively associated with life satisfaction. These findings are in line with challenge and threat theory in that they suggest an increase in perceptions of resource appraisals can lead to more adaptive responses to stress (Blascovich & Mendes, 2000; Jones et al., 2009). Though, the current study extends the research due to life satisfaction not specifically featuring within in the BPSM or TCTSA. Perhaps surprisingly, is the finding that approach was negatively associated with life satisfaction despite being a resource appraisal to promote a challenge state within the TCTSA. Approach goals reflect a drive for competence and can be useful in the face of challenging situations. For example, within sport, goals are important for an athlete responses to a stressful event and can have both promoting and deleterious effects on well-being through the appraisal process (Holt & Dunn, 2004). Although, when personally relevant goals are believed to be threatened, higher levels of anxiety are experienced (Lewthwaite, 1990). Therefore, despite striving for competence, it may be that this is at the cost of positive life satisfaction in certain circumstances.

Past literature also suggests that social identification and social support can have more positive effects to broader health and wellbeing outcomes including life satisfaction (Beals et al., 2009; Cohen et al., 2000; Jimmieson et al., 2010; Sani et al., 2012; Uchino, 2009), thus consistent with the current findings and those from chapter two. It is thought that group identification can help buffer an individual from everyday stressors by creating a sense of meaning and increasing the likelihood of social support and in turn enhancing satisfaction with life (Jetten et al., 2009). In one study, Coffman and Gilligan (2002) found that students

who reported higher levels of social support and self-efficacy and lower levels of perceived stress also reported higher levels of life satisfaction, which are akin to the current findings.

Between groups differences also emerged and revealed students reported higher avoidance, higher threat, lower self-efficacy, and lower social support scores, compared with the other groups. These findings could suggest that students have limited coping skills compared with the other groups in the study. Research also indicates that stress is becoming more prevalent among college and university students and as a result creating a global health crisis (Çivitci, 2015; Garrett et al., 2017; Thomas et al., 2017). This offers a necessary avenue for future researchers to tackle these adverse implications. In addition, the current results revealed females reported higher challenge and social support scores compared with males. This is similar to previous researchers that suggest that, compared to males, females have larger social networks and more emotionally involved in those networks accessing social support, especially in times of stress (Belle, 1991; Turner, 1994). Although there is limited research exploring the gender differences in challenge and threat, with those that do, have found no gender differences in challenge and threat appraisals (Kelsey et al., 2000; Tomaka et al., 1999) and cardiovascular reactivity (Blascovich et al., 1999; Moore et al., 2012). However, it is thought that there are gender differences in the willingness to accurately report negative feelings (i.e., threat) (Quigley et al., 2002), with women more likely to report stressful responses under math performance than men (Hyde et al., 1990) for example. Therefore, this is an important consideration for future researchers adopting self-report measures of cognitive appraisal.

Despite the current findings, the research is not without its limitations and should be acknowledged. First, given that the study is a cross-sectional atemporal design, we can make no inferences pertaining to cause and effect. Therefore, more longitudinal research designs with multiple data collection points would be useful in future research. This would be



particularly useful in exploring the directionality of the relationship between social support and social identity, as well as how these social factors may mediate/moderate the relationships between the resource appraisals to determine challenge and threat and other outcome variables (i.e., perceived stress, life satisfaction). Second, the use of self-report measures can result in response biases (i.e., social desirability). Further, there are issues when trying to capture cognitive appraisals through self-report, given that these often occur at an unconscious and automatic level (Blascovich & Mendes, 2000; Seery, 2011). Future researchers could investigate emotional experience and challenge and threat using more objective psychophysiological markers (see Uphill et al., 2019) to better understand appraisals, emotions and coping. Third, the current chapter explored relationships between the social factors and challenge and threat on stress and life satisfaction across a range of various groups. As such, it perhaps overlooked some of the intricacies of the group context such as the individual's role within the group and specific group outcomes (i.e., performance). Therefore, by focusing solely on specific groups (i.e., team sport athletes), it would allow for a greater understanding and exploration into the nuances of the aforementioned relationships.

To conclude, the present study was one of the first to investigate the associations between social identification, social support, challenge and threat appraisals on both perceived stress, and life satisfaction. Adopting a cross-sectional design across a range of group contexts, the findings provide evidence for the resource appraisals outlined in the TCTSA being associated with both social support and social identification, along with perceived stress and life satisfaction. Future researchers should look to examining these relationships between the social variables and perceived stress, utilising a more experimental methodology.

To further establish the relationship between social support and social identification on challenge and threat, the next chapter assesses the situational responses to a stressful situation. Findings from current chapter also revealed that students demonstrated a more unhelpful response to perceived stress, so further exploration into a student sample is warranted. Chapter four builds from previous chapters in the thesis by adopting an experimental design to manipulate key social variables to assess the influence on the responses to stress.

## **CHAPTER 4: “THE CHOICE IS YOURS”: SELECTING SOCIAL SUPPORT ON APPROACH TO A HYPOTHETICAL SPEECH TASK**

### **4.1 Introduction**

Chapter three indicated that the resource appraisals outlined in the TCTSA and challenge were positively associated, while threat was negatively associated with both social support and social identification. There was also evidence of these relationships being associated with perceived stress and life satisfaction. Specifically, there was some evidence of social support and social identification being positively associated with life satisfaction alongside two of the resource appraisals (control and self-efficacy). Chapter four builds on previous chapters by adopting an experimental design to explore how social factors such as social support and social identification could influence the resource appraisals of the TCTSA. The current chapter is centred on the perceptions of social support resulting from differing levels of identification to others on approach to an acute stressful situation. Accordingly, chapter four addresses the second aim of the thesis by investigating changes in resource appraisals and anxiety based on individuals' choice of social support towards an acute stress task.

In society, it is common for individuals to be faced with times in which they are required to perform important tasks under pressure (e.g., interviews, exams, sporting competition). When faced with a stressful stimulus, an individual will consciously and unconsciously make several appraisals concerning the personal relevance of the stimulus, and their ability to cope with the situation (Lazarus & Folkman, 1984). In a contemporary approach, the Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009) outline two distinct responses to a stressful situation, a challenge or threat state. The TCTSA, which is more specific to competitive contexts, extends the biopsychosocial model of challenge and threat (BPSM; Blascovich & Mendes, 2000), by introducing three interrelated

resource appraisals, namely self-efficacy, perceptions of control, and achievement goals. Overall, the TCTSA suggests that high levels of self-efficacy, perceived control, and a focus on approach goals, indicate sufficient resource appraisals on approach to a motivated performance situation, which is indicative of a challenge state. In contrast, low levels of self-efficacy, perceived control, and a focus on avoidance goals, indicate insufficient resource appraisals on approach to a motivated performance situation, which is indicative of a threat state. These evaluations of demands and resources have been proposed to be a result of an unconscious and automatic process rather than a conscious process (Blascovich, 2008). The TCTSA also adopts the demand appraisals (perception of danger, uncertainty, and required effort) and physiological markers seen within the BPSM to establish objective cardiovascular markers of challenge and threat. There is growing research utilizing the BPSM and TCTSA frameworks to examine challenge and threat in a variety of domains such as justice beliefs (Tomaka & Blascovich, 1994), social comparison (Mendes, Blascovich, Major, & Seery, 2001), social facilitation (Blascovich et al., 1999), classroom presentations (Zanstra et al., 2010), and most pertinent in the literature, performance outcomes (see Behnke & Kaczmarek, 2018; Blascovich et al., 2011; Hase et al., 2018; Seery, 2011 for reviews).

It has been argued that cognition is grounded in the social context in which it takes place (Turner et al., 1994). In other words, how an individual perceives (i.e., appraises) reality is embedded in the shared group memberships that they belong to. As such, scholars have noted a drawback of the stress related theories being that generally they take the social environment and the stressors it produces as a fixed entity rather than something that can be questioned and changed (Haslam et al., 2019). The TCTSA for example, has generally focused on the individual and seen this to be impervious to social influences (e.g., social support). Social support has been found to be vital to positive health and wellbeing outcomes (Beals et al., 2009; Cohen et al., 2000; Uchino, 2009), as well acting as a buffer to stress

(Cohen & McKay, 1984). Despite a revised version of BPSM (Blascovich, 2008) considering the availability of support as an antecedent of challenge and threat, there is limited research in this area and still warrants further investigation (Moore et al., 2014). For instance, social support has been proposed to influence the challenge and threat paradigm, with greater perceptions of support being a useful resource thus inducing physiological markers (i.e., higher cardiac output and reduced total peripheral resistance) to elicit challenge states (McGrath et al., 2011; Slater et al., 2016). Researchers have also found that social support is associated with improved coaches' stress related coping (Dixon et al., 2016; Dixon & Turner, 2018). However, social support is yet to be fully established as a resource appraisal and experimentally tested within a challenge and threat theoretical framework.

Researchers have explored the role of social support and its effectiveness in alleviating the maladaptive responses to stress (Uchino et al., 2011). In particular, scholars have examined the importance of demographics factors (i.e., age, sex, and social class) or individualised factors (i.e., personality, engagement in task; see Teoh & Hilmert, 2018; Thoits, 1995 for reviews). For example, by looking at the dyadic relations on approach to a stressful situation, researchers can examine both self-reported and objective (i.e., cardiovascular) markers of the stress response. One method has been to provide active support towards a stressor or challenging task through the use of supportive other(s). The second method has been to provide passive "mere presence" support using other(s) (Phillips et al., 2009). Although, only a couple of studies have examined the interpersonal relationship of the dyads by looking at the intimacy and supportive behaviours between the provider and recipient (Christenfeld et al., 1997; Phillips et al., 2009).

The provision of social support is always dependant on the relationship between the provider and recipient (Haslam et al., 2012). In this regard, it is plausible to suggest that social support will be experienced more effectively if there is a level connectedness (i.e.,

identification) between the parties concerned. In support of this, individuals who identify strongly with a certain group (e.g., their sports team) are also more likely to receive social support from other members of that group (Avanzi et al., 2015; Haslam et al., 2005; Levine et al., 2005). Social identification refers to an individual's sense of self that is associated with their membership in a given group (Tajfel & Turner, 1979) and at the heart of this is the Social Identity Theory (SIT; Tajfel & Turner, 1979) and Self-Categorisation Theory (Turner et al., 1987). Having a shared social identity has been proven to have a number of positive effects on health and well-being (Haslam et al., 2018; Sani et al., 2012). Further, possessing a shared group membership has also shown to have indirect effects on health and well-being through moderating the effects of social support (Haslam et al., 2005). Social identity is thought to influence the appraisal process and provide a basis for the giving and receiving of social support (Haslam et al., 2004, 2009).

Chapters two and three have provided some supporting evidence of social support and social identification being positively associated with the resource appraisals and being influential in the stress response. An area of identification research that has received little attention is relational identification (RI; Sluss & Ashforth, 2007), as the focus has predominantly been on the individual or the group as a collective. Stemming from the SIT, RI can be defined as “the extent to which one defines oneself in terms of a given role-relationship” (Sluss & Ashforth, 2007, p.11). To put another way, Sluss and Ashforth posit the strength of interpersonal dyadic relationships can provide some understanding of how individuals define themselves in group settings. Most of the research on RI has explored the relationship with a leader figure (i.e., manager, coach, captain, parent) and have found that strong levels of RI with a leader can influence positive group identification (Sluss et al., 2012). More recently, Slater et al. (2018) found that high RI with a leader increased follower mobilisation, resource appraisals, and cognitive task performance. Additionally, low RI

evinced a threat response to a pressurised task compared with those in the neutral condition, who displayed a greater level of challenge. While some studies have looked at the supportive behaviour or the intimacy of the individuals involved in dyads (e.g., Christenfeld et al., 1997; Phillips et al., 2009), there is still a limited understanding concerning how the strength of the relationship (i.e., levels of RI) can have an effect on the stress response.

To address this gap in the literature on the role of RI in the stress response and build from chapters two and three, the current chapter aims to investigate acute stress responses within an experimental design to examine the causal role of the social variables (i.e., social support & RI) on the resource appraisals of the TCTSA. Most of the experimental research examining social support has randomly assigned participants to conditions, however, in this study, we were interested in the natural selection of support conditions in the build up to an upcoming stressful task. Specifically, the aim was to examine the changes in resource appraisals and anxiety based on individuals' choice of social support towards a stressful task. The current research adopted a repeated measures hypothetical experimental design to assess how levels of social support and RI can influence resource appraisals and perceived anxiety. Participants were asked to imagine preparing for a speech task. They were also given the opportunity to select a preferred option (support conditions) to help them prepare (i.e., prepare alone, with a close friend, or with someone they do not know). It is suggested that those select to prepare alone would relate to no RI, while stranger would relate to low RI, and friend would be high RI conditions. Hypothetical situations have been used in past challenge and threat (Skinner & Brewer, 2002), social support (Barling et al., 1988) and social identity research (Slater et al., 2019). It was hypothesized that those who selected the support condition (friend or stranger) when imagining preparing for a stress task will report feeling more supported, and that to be more helpful, than those who chose to prepare alone (H1). In addition, the resource appraisals and anxiety would predict the choice of support participants

selected (H2). Further, those who chose one of the support conditions will report greater ratings of support (amount and helpfulness), which will predict greater self-efficacy, control, approach goals, and lower avoidance goals (H3), also in turn to predict lower anxiety (H4) than those in the alone condition. Lastly, to get a deeper understanding of why the support decisions were made and to establish any commonality in responses, participants reasons for their choice of support were collected.

## 4.2 Method

### 4.2.1 Participants

A total of 198 (female = 84, male = 114) participants ( $M_{\text{age}} = 22.69$ ,  $SD_{\text{age}} = 7.06$  years) took part in the study. The participants were university students recruited through opportunistic sampling. With a power of .8 and an alpha of .05, a target sample of 92 was deemed sufficient to detect a medium effect ( $f^2 = .15$ ) according to an apriori calculation using G\*Power for multiple regression analysis.

### 4.2.2 Measures

***Social factors and attention check.*** Two questions were asked in measure of support based on the selection of support. These included “How much support would you expect to receive within the 5 minutes?” and “How helpful do you expect the support to be in preparing for the speech task?” items were rated on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very*).

***Resource appraisals.*** Similar to chapter three, participants completed one item adapted from Meijen et al. (2014), in which they indicated the extent they agreed or disagreed with the following statement: “I feel that I have control over the situation to demonstrate my skills to the best of my ability” on a 5-point scale, ranging from 0 (*not at all*) to 4 (*extremely*). A shortened version of the Achievement Goals Questionnaire (AGQ; Conroy et al., 2003) was also used. An approach and avoidance mean score was also created. A Self-Efficacy



Scale (SES) was developed in line with Bandura's (2006) suggested guidelines. The seven items were: staying focused, speaking clearly, complete the task to the best of your ability, perform when things get tough, talking for the required time, recover well if mistakes are made, and staying motivated. Participants rated themselves on how confident they felt at executing each skill in the upcoming speech task. Responses were made on a 5-point Likert-scale ranging from 1 (*not at all*) to 5 (*completely*). A self-efficacy score was calculated by averaging the seven scores. Cronbach's alpha for the SES from the current sample was  $\alpha = .88$  (baseline) and  $\alpha = .90$  (post) demonstrating very good internal consistency.

**Anxiety.** The State-Trait Anxiety short form Inventory Y-6 item (STAI: Y-6 item: Marteau & Bekker, 1992) was used. The measure consists of six items developed from Spielberger et al's (1983) STAI. All items are rated on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much so*) and multiplied for a total range of 20-80. Cronbach's alpha for the STAI Y-6 from the current sample was  $\alpha = .85$  (baseline) and  $\alpha = .84$  (post), demonstrating very good internal consistency.

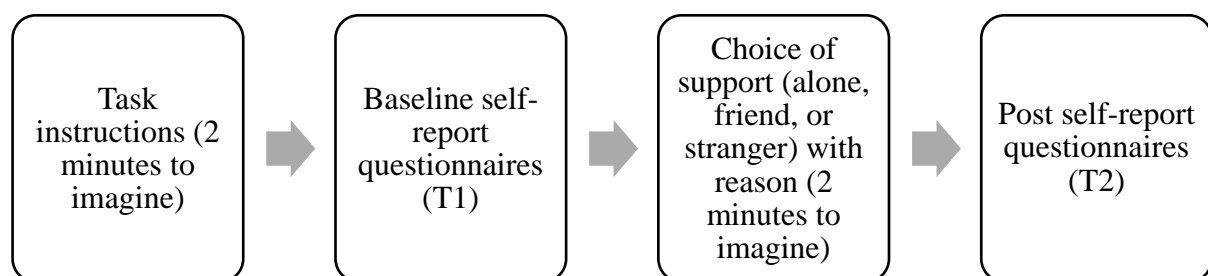
#### **4.2.3 Procedure**

Ethical approval was granted from an institutional ethics panel and individual informed consent was obtained prior to data collection. Data collection took place across several lectures and seminars within a university in the UK. Participants were provided informed consent and demographic information before reading the task instructions. Following this, participants were instructed to take 2 minutes to imagine the situation - preparing for the interview speech. Specifically, participants were given written instructions to imagine preparing for a 5-minute interview for their dream job (see appendix 3). They were instructed that their speech was to be video-recorded and later viewed by a panel of recruitment experts. They had 5 minutes to prepare for their speech and were not allowed to make any notes. This task was based on the Trier Social Stress Test (TSST; Kirschbaum et

al., 1993, 1992). The TSST is formed around public speaking and has been shown to be an ecologically valid stressor which is reliable to induce an acute stress response (Allen et al., 2017; Dickerson & Kemeny, 2004; Hellhammer et al., 2007). Due to the hypothetical nature of the study, once given the task instructions participants were asked to confirm they understood what was required of them. If they answered “no” they were instructed to speak with the lead researcher who answered any questions.

The participants then completed the first round of self-report questionnaires (timepoint 1; T1: control, achievement goals, self-efficacy, and anxiety). Participants were then given the choice to select and imagine one of three support conditions: (1) prepare alone (no RI); (2) prepare with a close friend (high RI); or (3) prepare with someone they do not know (low RI). They were also asked to give a reason for their choice. The researcher assisted with any questions they had. Following this, participants were instructed to take two minutes to imagine preparing based on their selected preference. Finally, participants completed the second round of self-report questionnaires (timepoint 2; T2), which also included the two support questions. See figure 4.1 for schematic representation of the data collection protocol.

Figure 4.1 An overview of the data collection protocol.



#### 4.2.4 Analytic strategy

Data were first examined for outliers and normality to ensure data met the assumptions for parametric testing. Significant outliers with  $z$  scores greater than two were winsorized (Salkind et al., 2010; Smith, 2014). Overall, 3.67% of the data were winsorized.

As only 12 participants chose preparing with a stranger, a 'support' variable was created for those who selected either friend (N= 100) or stranger as their preferred option, creating a total of 112 participants in the support condition. Descriptive statistics of the data are reported in Tables 4.1 and 4.2.

To test the predictive nature of sex and social support on resources appraisals, and anxiety, change scores were created by subtracting timepoint 1 values away from timepoint 2 values. Timepoint 1 was controlled for in the regressions as this is the preferred method when using change scores as a dependant variable (Dalecki & Willits, 1991).

To attention check the participants and examine H1, a MANOVA was conducted to assess the difference between the two support choice groups (alone vs. support) on how much support and helpfulness of support they anticipated. It was expected that those who chose to be supported would report more support and consider it to be more helpful than those who chose no support. A binomial logistic regression was also performed to examine if the timepoint 1 resource appraisals and anxiety predicted the choice of support participants selected (H2).

To test whether choice of support and the accompanying ratings of the support predicted the resource appraisals (H3) and anxiety (H4), a series of four-step multiple hierarchical regression analyses were conducted with resource appraisal change (self-efficacy, control, approach/avoidance goals) as the dependant variables. Sex was entered at step 1 of the regression, timepoint 1 resource appraisal (self-efficacy, control, or approach/avoidance goals) at step 2, choice of support was entered at step 3, and both the social support questions were entered at step 4 (H3). A five-step multiple hierarchical regression analysis was then conducted with anxiety change as the dependant variable. The first four steps were similar as the above (sex, timepoint 1 anxiety, choice of support and social support) with the addition of step 5 which included all resource appraisal change scores

(H4). To analyse the reasons for the support selection, content analysis was conducted to look at frequency counts of the written responses to establish any patterns or commonality in responses.

### 4.3 Results

In terms of support selection, 86 participants chose to prepare alone (males = 52, females = 34) and 112 chose to be supported by either a friend or stranger (males = 62, females = 50). Table 4.1 contains descriptive statistics and bivariate correlations coefficients between all study variables. No correlation coefficient exceeded .80 indicating that multicollinearity was not an issue in further analyses.

Table 4.1 Means, Standard Deviations, and Bivariate Correlations for all variables

N= 198	M	SD	Scales (Cronbach's alpha)	1	2	3	4	5	6	7	8	9
1. Condition	.57	.50		-	.05	.48**	.53**	.08	-.01	-.17*	.20**	.00
2. Sex	.42	.50			-	.08	.13	.08	-.02	-.02	.05	-.17*
3. How much support	4.02	1.64	1-7			-	.73**	.02	-.04	-.09	.05	-.07
4. Helpfulness of support	4.63	1.52	1-7				-	.14*	-.01	-.01	.13	-.07
5. Control change	.38	.86	1-5					-	.17*	-.10	.41**	-.22**
6. Approach change	-.26	.62	1-7						-	.19*	.16*	-.09
7. Avoidance change	-.21	.92	1-7							-	-.08	.20**
8. Self- efficacy change	.11	.41	1-5 (T1=.88, T2= .90)								-	-.27**
9. Anxiety change	-3.89	7.54	1-4 (T1= .85, T2= .84)									-

Note: \*  $p < .05$ , \*\*  $p < .01$ ; Alone coded at 0, supported coded at 1; Male coded at 0, female coded at 1

#### Attention check (social support)

A MANOVA indicated significant differences for the amount and the helpfulness of the support between the two support groups (alone vs support), Wilks'  $\Lambda = .699$ ,  $F(2,195) =$

42.07,  $p < .001$ ,  $\eta^2_p = .30$ . As expected, and in support of H1, post-hoc tests revealed that the support groups reported greater amount of support ( $p < .001$ ), and this to be more helpful ( $p < .001$ ) than those who selected the alone option (Table 4.2). This suggests that participants were paying attention and they made a conscious choice in selecting the support options.

### **Predicting the choice of support**

A logistic regression examining timepoint 1 resource appraisals and anxiety in predicting the choice of support participants selected revealed a non-significant relationship and in contrast to H2,  $\chi^2(8) = 5.361$ ,  $p = .718$ . The model explained 2.7% (Nagelkerke  $R^2$ ) of the variance in choice of support and correctly classified 62.1% of cases. As such, timepoint 1 resource appraisals and anxiety were not associated with choice of support participants selected.

### **Predicting change in resource appraisals**

As shown in Table 4.3 the hierarchical multiple regression revealed that for all resource appraisal change, sex did not account for a significant proportion of the variance, but choice of support at step 3 and social support at step 4 did. For self-efficacy, standardised coefficients revealed that choice of support ( $\beta = .18$ ,  $p = .02$ ) was positively related to increases in self-efficacy. For control change, helpfulness of support ( $\beta = .20$ ,  $p = .01$ ) was positively related to increased control. For avoidance change, choice of support ( $\beta = -.21$ ,  $p = .01$ ), and helpfulness of support ( $\beta = .21$ ,  $p = .04$ ) were significantly related to avoidance change. In sum, and in partial support of H3, choosing to be supported was related to increased self-efficacy and decreased avoidance goals, and greater helpfulness of support was related to increased control and decreased avoidance goals.

### **Predicting change in anxiety**

As shown in Table 4.4 the hierarchical multiple regression revealed that for anxiety change, all steps significantly accounted for the proportion of the variance. When all

variables were included in step five of the regression, standardised coefficients revealed that only greater avoidance change ( $\beta = .22, p = .001$ ) was positively related to increases in anxiety and thus in partial support of H4.

Table 4.2 Means and Standard Deviations across the conditions

N= 198 Alone (n= 86; males= 52, females= 34) Supported (n=112; males= 62, females= 50)	Choice of support (T1)				Choice of support (T2)				Choice of support (change)			
	Alone		Supported		Alone		Supported		Alone		Supported	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
How much support	3.13	1.62	4.71	1.30								
Helpfulness of support	3.71	1.44	5.34	1.16								
Control	3.58	.93	3.63	.80	3.90	.69	4.08	.67	.30	.83	.45	.88
Approach	5.98	.98	6.07	.92	5.73	1.06	5.80	1.00	-.26	.65	-.26	.61
Avoidance	4.59	1.42	4.77	1.32	4.53	1.48	4.41	1.45	-.03	.83	-.34	.97
Self- efficacy	3.71	.76	3.70	.66	3.73	.69	3.87	.58	.02	.40	.18	.40
Anxiety	46.51	13.58	45.09	11.23	42.64	11.75	41.37	10.55	-3.91	7.18	-3.87	7.83

Table 4.3 Hierarchical regression analyses for sex, choice of support, and social support predicting resource appraisals change

	Step 1				Step 2				Step 3				Step 4			
Self-Efficacy																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Sex	.043	.059	.052	-.073, .158	.012	.052	.014	-.091, .114	.003	.051	.004	-.097, .104	-.002	.051	-.003	-.103, .099
T1 self-efficacy					-.273	.037	-.470	-.345, -.200**	-.273	.036	-.471	-.344, -.202**	-.272	.036	-.469	-.343, -.201**
Choice of support									.161	.051	.197	.062, .261**	.149	.060	.182	.030, .268*
How much support													-.025	.023	-.102	-.070, .019
Helpfulness of support													.032	.025	.120	-.018, .083
R <sup>2</sup>	-.002 ( $\Delta R^2=.003$ )				.214**( $\Delta R^2=.220$ **)				.250**( $\Delta R^2=.039$ **)				.249**( $\Delta R^2=.007$ )			
Control																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Sex	.140	.123	.081	-.103, .383	.011	.090	.006	-.166, .188	.002	.089	.001	-.174, .177	-.022	.089	-.012	-.197, .154
T1 control					-.698	.052	-.694	-.800, -5.95**	-.701	.052	-.697	-.803, -.599**	-.695	.051	-.692	-.797, -.594**
Choice of support									.175	.088	.101	.000, .349	.085	.104	.049	-.121, .291
How much support													-.057	.039	-.108	-.134, .020
Helpfulness of support													.110	.044	.195	.023, .197*
R <sup>2</sup>	.001 ( $\Delta R^2=.007$ )				.477**( $\Delta R^2=.476$ **)				.485**( $\Delta R^2=.010$ )				.496**( $\Delta R^2=.016$ *)			
Approach																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Sex	-.024	.090	-.019	-.201, .154	-.019	.088	-.015	-.192, .155	-.019	.088	-.015	-.193, .155	-.026	.089	-.021	-.202, .150
T1 approach					-.149	.046	-.226	-.240, -.058**	-.149	.046	-.226	-.241, -.058**	-.158	.047	-.239	-.251, -.064**
Choice of support									.007	.088	.005	-.167, .181	-.007	.106	-.006	-.215, .201
How much support													-.036	.039	-.094	-.114, .042
Helpfulness of support													.044	.045	.107	-.046, .133
R <sup>2</sup>	-.005 ( $\Delta R^2=.000$ )				.042**( $\Delta R^2=.051$ **)				.037* ( $\Delta R^2=.000$ )				.032*( $\Delta R^2=.005$ )			
Avoidance																
Variable	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Sex	-.029	.133	-.015	-.292, .234	.121	.132	.065	-.138, .381	.131	.130	.070	-.126, .389	.104	.130	.056	-.153, .362
T1 avoidance					-.214	.048	-.315	-.309, -.120**	-.208	.048	-.306	-.302, -.115**	-.210	.047	-.309	-.304, -.117**
Choice of support									-.277	.126	-.149	-.526, -.028*	-.383	.150	-.206	-.678, -.088*
How much support													-.064	.056	-.114	-.174, .046
Helpfulness of support													.128	.063	.210	.004, .252*
R <sup>2</sup>	-.005 ( $\Delta R^2=.000$ )				.084**( $\Delta R^2=.093$ **)				.101**( $\Delta R^2=.022$ *)				.111**( $\Delta R^2=.128$ )			

Note. \*  $p < .05$ , \*\*  $p < .01$ . Males were coded 0, and females were coded 1.

Table 4.4 Hierarchical regression analyses for sex, choice of support, social support and resource appraisal change predicting anxiety change

Variable	Step 1				Step 2				Step 3				Step 4				Step 5			
	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs	b	SE	$\beta$	95% CIs
Sex	-2.550	1.071	-.168	-4.663, -.437*	-.135	1.011	-.009	-2.129, 1.860	-.105	1.016	-.077	-2.110, 1.899	-.014	1.027	-.001	-2.039, 2.011	.113	.972	.007	-1.805, 2.032
T1 anxiety					-.294	.041	-.479	-.374, -.214**	-.295	.041	-.482	-.376, -.214**	-.294	.041	-.480	-.376, -.213**	-.282	.040	-.459	-.360, -.203**
Choice of support									-.369	.958	-.024	-2.258, 1.520	.212	1.148	.014	-2.054, 2.477	1.347	1.119	.089	-.860, 3.554
How much support													-.089	.428	-.019	-.933, .754	-.164	.410	-.036	-.973, .645
Helpfulness of support													-.272	.483	-.055	-1.224, .680	-.249	.467	-.050	-1.171, .673
Self-efficacy																	-.2046	1.265	-.110	-4.542, .450
Control																	-.1151	.591	-.131	-2.316, .014
Approach																	-.874	.752	-.072	-2.357, .610
Avoidance																	1.788	.512	.219	.778, 2.799**
R <sup>2</sup>	.023* ( $\Delta R^2=.028^*$ )				.225**( $\Delta R^2=.205^{**}$ )				.222**( $\Delta R^2=.001$ )				.217**( $\Delta R^2=.003$ )				.303**( $\Delta R^2=.098^{**}$ )			

Note. \*  $p < .05$ , \*\*  $p < .01$ . Males were coded 0, and females were coded 1.



### **Reasons for support selection**

Results from the content analysis displaying the categories and the frequency of responses can be seen in the supplementary materials (Appendix 3). For those who chose no support (alone), the reason with the highest frequency was ‘time to gather own thoughts and focus with less distractions’ (61.7%). For those who chose to be supported by a friend, the reason with the highest frequency was to ‘share ideas and practice’ (28.8%). Lastly, for those who chose to be supported by a stranger, the reason with the highest frequency was ‘more practice’ (28.6%).

## **4.4 Discussion**

The present study set out to address the second aim of the thesis and investigate the changes in resource appraisals and anxiety based on individuals’ choice of social support towards a stressful task. This extends past research by providing evidence on how levels of social support and RI can influence resource appraisals and symptoms of anxiety. Participants selected to either be (hypothetically) supported by friend (high RI), stranger (low RI), or be alone (no RI). By adopting a repeated-measures hypothetical experimental design, measures of resource appraisals and anxiety were taken both pre-and post-selection of participants’ preferred choice of support. The current study is the first to examine the selection of desired support on approach to an upcoming stressful task and how this could influence the resource appraisals outlined in the TCTSA and perceived anxiety.

In accordance with the study hypotheses, the results indicated that those who selected the support condition reported feeling more supported, and that to be more helpful, than those who chose to prepare alone for the stress task in support of H1. Contrary to study hypotheses, baseline resource appraisals and anxiety did not predict choice of support (H2), but there was partial support for H3 in that the those who chose to be supported experienced increases in self-efficacy and a reduction in avoidance when compared with those who chose not to be

supported. In addition, helpfulness of support was positively associated with increases in control and decrease in avoidance goals. Results also revealed that only avoidance change was positively associated with changes in anxiety (H4). Therefore, the results suggest that being supported on approach to a hypothetical stressful task and the helpfulness of that support were associated with resource appraisals outlined within the TCTSA.

Given that participants had the choice to select the support condition on approach to the stressful task, it is not surprising to see that fewer participants chose to prepare with a stranger and that those who selected one of the support conditions reported feeling more supported, and that to be more helpful, compared to those who chose to prepare alone. Not only acting as an attention check, this also corroborates the idea that when faced with a stressful situation, individuals tend to look to others (especially someone they are close with) to provide support to help with the stressor (Cohen & McKay, 1984). Specifically, when it comes to stressful situations, individuals tend to draw on others for information on appropriate emotional responses, and for relevant information to best deal with the situation.

While baseline resource appraisals and anxiety did not predict choice of support condition, the qualitative statements provided by participants offers a novel insight to the possible reasons for their selection. Considering the current findings, it appears that while a close friend can provide an opportunity to share ideas and practice, others see this as an unhelpful distraction and thus chose to prepare alone or with someone they do not know. It may be that when in the face of a stressful task, while a close friend may seem like a good person to prepare with, they may not be the best person to offer the appropriate support to achieve optimal performance in the task. In one study, when compared with preparing alone, participants preparing with a friend only displayed superior performance on a problem solving task when they felt that they were being provided support from their friend (Lahey & Heller, 1988). Additionally, the participants who perceived high levels of support also rated

the task as less stressful. A worthy consideration when looking at achieving the desired effects of social support should also be directed in the matching of the types of support to specific stressors (Cutrona & Russell 1990). Therefore, understanding how and why individuals may choose to be supported on approach to a stressful situation has important implications to the stress and coping literature and warrants further investigation.

Choice of support and subsequent ratings of helpfulness was associated with the resource appraisals of the TCTSA, in that the those who chose to be supported and perceived it as helpful, experienced increases in self-efficacy and control along with a reduction in avoidance goals compared with those who chose not to be supported. Accordingly, this is perhaps deemed as a beneficial response to a stressor, especially for performance outcomes. For example, high levels of self-efficacy, control along with a focus on approach goals (as opposed to avoidance goals) indicate sufficient resources leading to a challenge state (Jones et al., 2009). There has been an inconsistency in past findings looking at self-efficacy to explain potential mechanisms of the social support-performance relationship. While some suggest that social support moderates the relationship between stressors and task performance through self-efficacy (Rees & Freeman, 2009), others have found self-efficacy could not explain performance differences between support conditions (Moll et al., 2017).

In line with the current findings, researchers have also suggested that high levels of perceived available support may lead individuals to feel in control (Cohen, 1988; Schwarzer & Leppin, 1991). This is perhaps more evident when individuals are seeking support, as this could be seen as an engaging coping strategy and leading to perceptions of control. However, researchers have yet to find evidence to support this notion, and suggest the actual result of the search for support could be vital for beneficial outcomes (Dijkstra & Homan, 2016). In a different view, researchers have found that the greater an individual's sense of perceived control, the more one is buffered from any negative effects of support transactions (Ryon &

Gleason, 2018). Elaborating on this further, while social support has well established health and well-being benefits, the actual receipt of support can be ineffective and even detrimental (Bolger & Amarel, 2007; Gleason et al., 2003, 2008). For example, supportive actions can be misinterpreted (Lehman & Hemphill, 1990; Rosland et al., 2012), or create feelings of inequality and indebtedness (Bolger & Amarel, 2007; Gleason et al., 2003), and be a risk to self-esteem following the support (Fisher et al., 1982). Consequently, the interplay between perceptions of control and perceived support may provide valuable in achieving the intended effects and results from the current study offer some evidence for these positive interactions.

The present results also revealed that only avoidance change was positively associated with changes in anxiety. In other words, as avoidance goals increase so does perceptions of anxiety. The TCTSA posits that a focus on avoidance goals is likely to contribute to an individual responding to a stressful situation as a threat, and thus considered an unhelpful response to the stressor, especially in terms of performance outcomes. In support of the current study, researchers have also found that avoidance behaviours were likely to lead to more anxiety related symptoms (Barlow, 2002) and individuals to be more risk-avoidant in decision making (Maner & Schmidt, 2006). In chapter three, while anxiety specifically was not measured, it was seen that avoidance goals were linked with increased perceived stress providing further evidence of an unhelpful response to adopting avoidance behaviours in the face of stressful situations. While, no other resource appraisals were significantly linked to an increase in anxiety, previous researchers have found that individuals who scored higher on avoidance experienced a lower sense of control and lower psychological well-being (Dijkstra & Homan, 2016). Collectively, evidence from the current study along with past research suggest the strong link between avoidance behaviours and anxiety which offers useful implications for theory and practice. For instance, to explore ways to help foster more of an approach goal focus on the lead up to a stressful situation.

The findings from the present study also have some important applied implications. First, offering autonomy and the choice to participants to select their preferred method of preparation for a stressful task revealed that most opted to be supported (by a friend) rather than selecting to prepare alone. Nevertheless, this difference was not considerable which suggests that there is variability in how individuals prefer to prepare for a stressful task. Interestingly, despite people choosing to prepare alone, this was not associated with greater helpfulness or changes in resource appraisals as seen within the support condition. Thus, indicating that individuals may not truly understand the benefits of being supported prior to a stressful task. Therefore, an awareness of the potential benefits to a supportive network may aid in fostering more adaptive responses to stress. Second, the study demonstrates that if an individual can imagine the support available to them then this can have some positive associations to the resource appraisals outlined in the TCTSA. As such, this could be utilised in the manipulation of the resource appraisals, whilst including social support. For example, past research have used instructional sets (e.g., Turner et al., 2014) and imagery (e.g., Williams et al., 2010) to elicit both challenge and threat states. Therefore, with the inclusion of instructions (verbal or imagined) around encouraging individuals to reflect on their social support network, this could help to elicit adaptive responses and positive performance outcomes. Further if imagined, as the mind is not bound to reality the support is more likely to be close to the ideal to provide the optimal benefits to the individual. However, empirical research to test these conjectures is needed and would be encouraged.

The current study is not without limitations which offer considerations for future researchers. The study adopted a hypothetical design and therefore findings may have limited relevance in real-world contexts. In addition, the study relied on self-report measures which are subject to bias and previous researchers have indicated that these self-report measures of challenge and threat in particular are inconsistent with objective stress markers (Meijen et al.,

2014; Turner et al., 2012). Future researchers should look to compliment self-report measures with more objective measures to improve reliability of findings. To further understand the complexity of social support preferences in the face of stressful situations, future researchers could conduct qualitative based interviews to gather more detailed and richer data of participants decisions. In particular, to look at how different types of support (i.e., emotional, instrumental, informational, appraisal) are more effective when facing specific types of stressors (Cutrona & Russell 1990).

In conclusion, the current chapter adopted a novel approach to examine how social support and relational identification could influence resource appraisals of the TCTSA and anxiety symptoms. Results demonstrate that when faced with a stressful task, being supported by another individual is likely to be viewed as helpful and increase perceptions of self-efficacy and control, while decreasing avoidance goals, thus in turn reducing anxiety. In other words, when faced with a stressful task, some individuals opt to be supported, and if they do, this leads to more adaptive responses through increased resource appraisals and reduced anxiety. The current research also provided a unique opportunity to explore the various reasons for the autonomous selection of the support conditions when preparing for an upcoming stress task. The findings extend that of previous chapters and past research by examining the change that social factors can have on cognitive resource appraisals and anxiety. It is hoped that this study encourages future researchers to explore the role that these social factors can play in the resource appraisals and to better understand the complex mechanism that these variables can have in the stress response.

The studies in the thesis so far have focused on self-report data which could be susceptible to bias. Given that challenge and threat states can be distinctively marked by different patterns of cardiovascular reactivity, it is important to assess the role of the social factors in the stress response using more objective markers to gain a more holistic and greater

understanding of the stress response. Specifically, the next chapter will address the third aim of the thesis and explore the effects of social support and relational identification on cardiovascular stress responses on approach to a speech task, like the one used in the current chapter. In the current chapter, the stranger condition was the lowest selected ( $n = 12$ ) with friend being the highest ( $n = 100$ ) when preparing for a stressful task. Therefore, to complement and extend previous findings, the first study in chapter five sought to compare the most and least preferred support conditions, namely stranger and friend conditions, by looking at psychophysiological markers of stress.

## **CHAPTER 5: THE ROLE OF SOCIAL SUPPORT AND RELATIONAL IDENTIFICATION IN CHALLENGE AND THREAT APPROACHES TO PSYCHOLOGICAL STRESSORS.**

### **5.1 Introduction**

Psychological stress is considered to be a transactional process pertaining to an interaction between individual and environment, through cognitive appraisal (Lazarus & Folkman, 1984). Contemporary theory posits that fundamental to this transactional process are the concepts of challenge and threat, whereby challenge reflects an adaptive psychophysiological response to stress, and threat reflects a maladaptive psychophysiological response to stress (e.g., Dienstbier, 1989). The extent to which challenge and threat are exhibited on approach to a motivated performance situation (e.g., exam, public speaking, sporting performance) is dependent on the balance between perceived situational demands (demand appraisals), and perceived personal resources (resource appraisals). One prominent theory that conceptualises the challenge and threat framework is the Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009). Developed from the biopsychosocial model of challenge and threat (BPSM; Blascovich & Mendes, 2000), the TCTSA extends the BPSM by introducing three interrelated resource appraisals, namely self-efficacy, perceptions of control, and achievement goals. Self-efficacy beliefs are judgements of what an individual can accomplish with his or her skills (Bandura, 1986). Perceived control refers to the beliefs the individual has about how much control is available (Jones et al., 2009). Achievement goals relate to an individual's motivation and the TCTSA adopts the 2x2 achievement goal framework that consist of mastery and performance goals associated with either goal approach or goal avoidance (Elliot & McGregor, 2001). The demand appraisals comprise of the perception of danger, uncertainty, and required effort, with a particular motivated performance situation. Overall, the TCTSA suggests that high levels of self-efficacy,



perceived control, and a focus on approach goals, indicate sufficient resource appraisals on approach to a motivated performance situation, which is indicative of a challenge state. On the other hand, low levels of self-efficacy, perceived control, and a focus on avoidance goals, indicate insufficient resource appraisals on approach to a motivated performance situation, which is indicative of a threat state.

Challenge and threat states are marked by distinct patterns of cardiovascular reactivity (CVR) and is well-supported in literature (see Behnke & Kaczmarek, 2018; Blascovich et al., 2011; Hase et al., 2018; Seery, 2011, for reviews). In a challenge state, an increase in sympathetic adrenal medullary (SAM) activation accompanied by catecholamine (epinephrine & norepinephrine) is met with increased heart rate (HR), cardiac output (CO), and decreased total peripheral resistance (TPR). A challenge response is representative of an efficient response to a stressor in which increased blood flow to the brain and muscles, higher blood glucose levels, and an increase in free fatty acids, can be used by muscles as fuel (e.g., Dienstbier, 1989, 1992). In a threat state, SAM activity is also increased. However, it is accompanied by increases in pituitary adrenal cortical (PAC) activity and the release of cortisol. PAC activity is thought to effect SAM activity by increasing or stabilising TPR and CO (Dienstbier, 1989, 1992). Consequently, in a threat state there is still an increase in HR, but there is a slight change, stabilisation, or small decrease in CO, and an increase or stabilisation in TPR. As a result, a threat response does not lead to an efficient energy delivery to the brain and muscles (Dienstbier, 1989, 1992). To put it simply, both challenge and threat states are marked by increased HR from rest, indicative of a motivated performance, but a challenge state is associated with efficient mobilisation of energy for action through the increases in CO and decreases in TPR reactivity, whereas a threat state is associated with a less efficient mobilisation of energy for action, through a stable or a decreased CO, and increased TPR reactivity (Blascovich & Mendes, 2000).

Despite the recognition that the social environment can influence cognitive appraisals (Lazarus & Folkman, 1984), the TCTSA predominantly focuses on egocentric factors (e.g., self-efficacy, control, goal orientation) and neglects potential social factors (e.g., social support). Social support was an element of the resource appraisal put forward by Lazarus and Folkman (1984), but the TCTSA does not make clear the role of social support in the stress response. Some authors (e.g., Slater et al., 2016), have suggested that social support may be a valuable resource to encourage challenge states particularly when underpinned by high social identification. Social identification reflects the extent to which an individual feels they belong to a group (e.g., an organisation, a work team, leisure group) (Haslam, 2004; Tajfel & Turner, 1979). Individuals who identify strongly with a certain group (e.g., their department at work) are also more likely to experience social support from other members of that group (Avanzi et al., 2015; Branscombe et al., 1999; Bruner et al., 2020; Haslam et al., 2005; Levine et al., 2005). This can also be supported by chapters two, three and four in the current thesis, which revealed positive relationships between social support and social identification. Chapters two and three also provide evidence to suggest that social support and social identification is positively associated with the resource appraisals outlined within the TCTSA. Chapter four further demonstrated that when faced with a stressful task, being supported by another individual is likely to be viewed as helpful and increase perceptions of self-efficacy and control, while also decreasing avoidance goals thus reducing anxiety. Previous researchers have shown that the resource appraisals can be manipulated to induce challenge and threat cognitive appraisals as well as subsequent CVR responses (e.g., Turner et al., 2012, 2013, 2014). As such, given that the social factors can influence the resource appraisals outlined in the TCTSA, it could be suggested that these may also have an effect on CVR which offers valuable implications (i.e., when trying to foster a challenge state). However, to date it is not

yet been established the precise role that social support and social identification can have on CVR in line with contemporary stress theory.

Studies that have explored social support on CVR report mixed findings, with some reporting reductions of reactivity following support (e.g., Broadwell & Light, 1999; Christenfeld et al., 1997; Kamarck et al., 1995; Lepore et al., 1993; O'Donovan & Hughes, 2008; Phillips et al., 2006; Thorsteinsson & James, 1999), with others reporting heightened reactivity (e.g., Anthony & O'Brien, 1999; Hilmert, Christenfeld, et al., 2002; Hilmert, Kulik, et al., 2002), and some even showing no effect of social support on CVR (e.g., Christian & Stoney, 2006; Craig & Deichert, 2002; Gallo et al., 2000). A review by Teoh and Hilmert (2018) found that in general, receiving social support led to reductions in CVR and perceptions of being supported and lower stress than those without support. Although, this was largely dependent on how engaged the individual was during the stressor, with a greater decrease in CVR seen in more engaging conditions. It appears that previous research highlights that social support may not solely induce positive effects and indicates a need to better understand and explore what makes supportive actions effective. In addition, past researchers who have examined the effects of social support on CVR, have not done so within the challenge and threat paradigm and therefore little is known about the influence of social support on CVR beyond HR and BP (O'Donovan & Hughes, 2008).

Recent research by Slater et al. (2018) found that high relational identification (RI) with a leader increased follower mobilisation, resource appraisals, and cognitive task performance. Additionally, CVR showed that low RI elicited a threat response to a pressurised task compared with those in the neutral condition, who displayed a greater level of challenge. Nevertheless, very few studies have measured social support and social identification together, so it is still unclear what role social support and social identification has on CVR to stress. Objective markers such as CVR provide an unbiased measure of the

stress response which can offer a valuable alternative and accompaniment to self-report measures. Accordingly, the main purpose of this chapter was to address the third aim of the thesis by testing the role of these social factors (relational identification & social support) using the TCTSA and BPSM CVR paradigm on approach to a motivated performance situation. Through two empirical research studies, study 1 uses repeated measures and explores the effects of two different support conditions (friend & stranger), while study 2 adds an additional support condition (alone). The main aim of both studies was to examine the effects of relational identification (RI) and social support on resource appraisals and CVR on approach to an acute stress task.

## 5.2 Study 1

The current study explored the effect of interpersonal relationships of friends and strangers on challenge and threat, social support, and anxiety towards a stressful situation. It is also to the authors knowledge the first study to examine changes in cardiovascular reactivity (CVR) indices of challenge and threat following a dyad preparation period on approach to a pressurised task. The use of a dyadic paradigm allows for the exploration of interaction effects between two individuals at the same time.

A between-participant experimental design was used in which participants were random block assigned to one of the two conditions: 1) those who received social support from a friend (friend condition), and 2) those who received support from someone they do not know (stranger condition) when preparing for an acute stress task.

Similar to chapter four, it was hypothesized that those in the friendship (high RI) condition would report more provided and received support than those in the stranger (low RI) condition on approach to a stress task (H1). It was also hypothesized that the friend condition (high RI) and the accompanying ratings of support will predict greater self-efficacy, control, approach goals, and lower avoidance goals (H2), which in turn will predict

lower anxiety (H3) than those in the stranger condition (low RI). It was also predicted that those in the friendship (high RI) condition will display more adaptive CVR following a support period than those in the stranger (low RI) condition on approach to a stress task (H4). Then, those in the friendship condition (high RI) and the accompanying ratings of support along with lower anxiety, greater resource appraisals, and more adaptive CVR, will predict better performance on the speech task (H5) than those in the stranger condition (low RI). It was also of interest to examine sex differences in particular for CVR, as previous researchers have shown differing HPA axis stress responses between males and females (Kudielka & Kirschbaum, 2005).

## 5.3 Method

### 5.3.1 Participants

A total of 84 (male = 44, female = 40) participants ( $M_{\text{age}} = 23.60$ ,  $SD_{\text{age}} = 7.03$  years) took part in the study. The participants were university students assigned to one of the two conditions: (1) friend ( $n = 46$ , males = 24, females = 22); and (2) stranger ( $n = 38$ , males = 20, females = 18). None reported currently suffering from any mental health issues related to stress or taking any medication with cardiovascular effects. Ethical approval was granted from an institutional ethics panel and individual informed consent was obtained prior to data collection. With a power of .8 and an alpha of .05, a target sample of 59 was deemed sufficient to detect a large effect ( $f^2 = .35$ ) according to an a priori calculation using G\*Power for multiple regression analysis.

### 5.3.2 Measures

#### Manipulation checks:

**Relational identification (RI).** Six items were adapted from Shamir et al. (1998) to measure identification with the other participant. Participants were asked to rate how far they agree with the following statements: I have complete faith in him/her, I respect him/her, I

trust his/her judgements and decisions completely, the person next to me represents values that are important to me, my values are similar to his/her values, and the person next to me is a model for me to follow on a five-point Likert-scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Cronbach's alpha for the RI from the current sample was  $\alpha = .92$  demonstrating very good internal consistency.

***Relationship quality and trust.*** Two items were taken from Gramer and Reitbauer (2010) to explore the length and nature of the two people, by asking "How long have you known this person?" (1= only just met) to (5= over 1 year), and "How close are you with this person?" (1= not at all close) to (4= very close). In addition, three trust questions were adapted from Giessner and van Knippenberg (2008). Participants had to indicate how far they agree with the following statements "I trust the person sitting next to me absolutely", "The person sitting next to me will do the right things", and "I think that the person sitting next to me is trustworthy", on a seven-point Likert-scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Cronbach's alpha for trust from the current sample was  $\alpha = .94$  demonstrating very good internal consistency.

***Anxiety.*** The State-Trait Anxiety Inventory Y-1 (STAI: Spielberger, et al., 1983) form was used. The measure consists of twenty items assessing state anxiety. All items are rated on a 4-point Likert scale ranging from 1 (*not at all*) to 4 (*very much so*). Cronbach's alpha for anxiety from the current sample was  $\alpha = .95$  (baseline) and  $\alpha = .96$  (post) demonstrating very good internal consistency.

### **Experimental variables:**

***Perceived control.*** As used in chapters three and four, participants completed the one item adapted from (Meijen et al., 2014) to measure perceived control.

***Achievement goals.*** A shortened version of the Achievement Goals Questionnaire (AGQ; Conroy et al., 2003) was used and an approach and avoidance score were also created

as seen in chapters three and four. One question was related to task importance which was used to as a task manipulation check.

***Self-efficacy.*** As seen in chapter four, the same seven item self-efficacy scale (SES) was used, and total score was calculated by averaging the scores. Cronbach's alpha for the SES from the current sample was  $\alpha = .90$  (baseline) and  $\alpha = .95$  (post) demonstrating very good internal consistency.

***Social support.*** Support was measured by using subscales measuring actually provided and actually received social support from the Berlin Social Support Scales (BSSS; Schulz & Schwarzer, 2003). These scales consisted of items assessing emotional, instrumental, and informational support. The BSSS was developed and validated for clinical populations, however can be used across healthy populations (Schulz & Schwarzer, 2003). Cronbach's alpha for the social support from the current sample was  $\alpha = .89$  (received) and  $\alpha = .85$  (provided) demonstrating very good internal consistency.

### **Cardiovascular Reactivity**

Cardiovascular reactivity (CVR) data was collected by using a non-invasive beat to beat blood pressure monitors, Finometer (Finometer® Model-1), and Portapres (Portapres® Model-2). These provide cardiovascular recordings in line with challenge and threat theory (Blascovich & Mendes, 2000; Jones et al., 2009) and previous research (e.g., Blascovich et al., 2004; Slater et al., 2018; Turner et al., 2013). Therefore, measures of Heart Rate (HR; bpm), Cardiac Output (CO; l/min), and Total Peripheral Resistance (TPR; dyne-s/cm<sup>-5</sup>) were examined in both individuals within the dyads. Participants were required to wear a finger cuff around their middle finger on their dominant hand. The Finometer and Portapres are highly accurate and has been widely used in both clinical and scientific research, for validation see Schutte et al. (2004).

### **Stress Task**

The task involved an adapted version of the Trier Social Stress Test (TSST; Kirschbaum et al., 1992; Kirschbaum et al., 1993). For the current study, standardised audio instructions were played to the participants through audio headphones. Participants were informed that they had to imagine they have been invited to an interview for their “dream job”. Therefore, they had five minutes to speak to and convince a panel watching through the video camera that they are the best person for the job. They were then instructed to sit still for two minutes to think about the upcoming speech. The speech was delivered in front of the camera and lead researcher. However, there was no panel watching the videos, as this was used as a further method to help elicit an acute stress response.

*Time speaking on task.* Performance on the speech task was determined by calculating the total talking time (seconds) within the five minutes. Breaks in the total talking time were determined when the participant stopped talking for over 10 seconds. Therefore, all pauses under 10 seconds were included to account for natural cognitive activity involved in speech production (Goldman-Eisler, 1972). Time until the first pause was also used as an indicator of performance. It was proposed that greater total talk time and greater time until first pause would indicate a more competent speaker and thus better performance.

### **5.3.3 Procedure**

Participants were randomly assigned to one of the two conditions (friend or stranger). Those assigned to the friend condition were asked to recruit one of their best same-sex friends, who agreed to accompany and participate in the study. Those who were assigned to the stranger condition were matched with a same-sex partner by the researcher. Same sex partners were used to eliminate potential effects resulting from opposite-sex interactions (Sheffield & Carroll, 1994). Group manipulation checks were assessed using relational identification, trust, time known each other, and closeness measures. After entering the laboratory, participants were provided with a brief verbal overview of the protocol and given



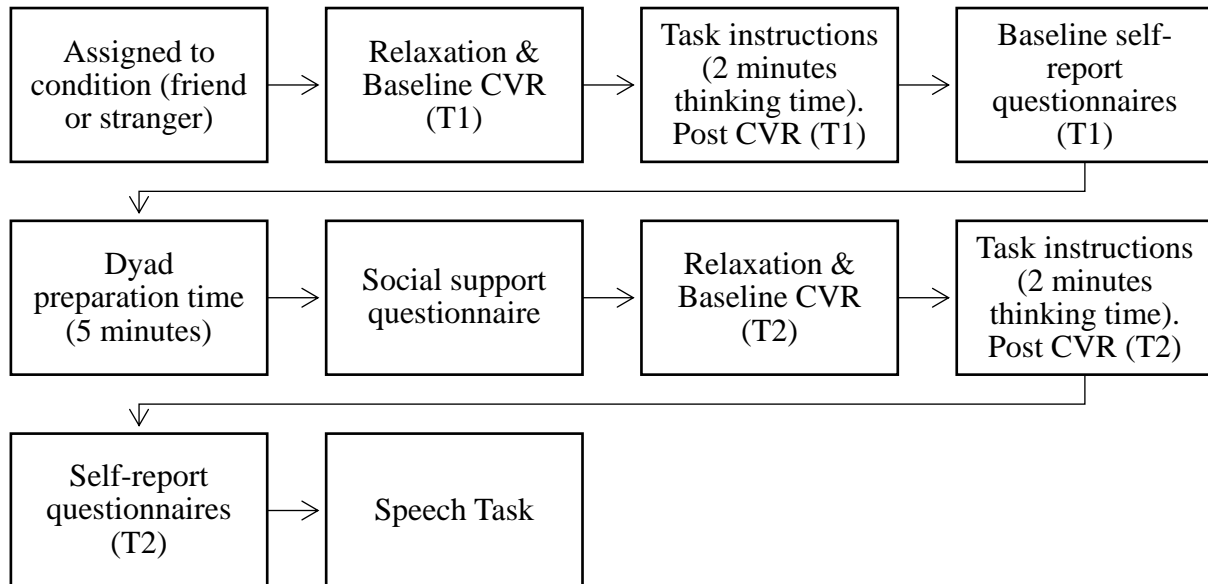
an opportunity to ask any questions. The participants were instructed to make no contact with the friend or stranger other than to say hello at the outset. Then, the participants were given information and consent forms to read and sign, along with demographic information and the RI, relationship quality, and trust self-report measures.

The two participants were then connected to the CVR recording devices as described above and listened to a three-minute progressive relaxation tape through a pair of headphones. This was to reduce any elevated effects of laboratory conditions and desensitize them to the environment. Once the audio clip had ended, they were instructed to sit silently for a further five minutes for baseline recordings of CVR indices. Following the baseline period, audio instructions (see appendix 4) about the speech task were played to the participants, along with a further two minutes of thinking time. Then, the CVR recording were ended, and participants were disconnected and instructed to complete self-report measures of resource appraisals, and anxiety towards the task. This was timepoint 1 (T1). The participants were then directed to sit at a table sitting opposite each other and given five minutes to prepare for the upcoming speech task. After the five minutes, they went back to their original seats and completed the social support measures in relation to the preparation time. They were then re-connected to the CVR recording equipment and followed similar steps as before so, relaxation script, five-minute baseline, instructions about the task, two thinking time, and completed the self-report measure of resource appraisals, and anxiety. This was timepoint 2 (T2).

Next, participants randomly took it in turns to complete the speech task while the other participant was positioned so they could not see the one delivering the speech and was asked to wear a pair of noise cancelling headphones. This was to minimize possible effects of them being able to evaluate the other participants performance (Kors et al., 1997). Lastly

participants were debriefed and thanked for their participation. See Figure 5.1 for schematic representation of the data collection protocol.

Figure 5.1 An overview of the data collection protocol for study 1.



### 5.3.4 Analytic strategy

Data were first examined for outliers and normality to ensure data met the assumptions for parametric testing. Significant outliers with  $z$  scores greater than two were winsorized (Salkind et al., 2010; Smith, 2014). Overall, 3.73% of the data were winsorized.

To assess the strength and validity of the conditions created, a MANOVA was computed to examine differences between the two conditions on RI, relationship quality (closeness and time known), and trust between the groups. A mean score of task importance measured within the AGQ was also reported. To test H1 that those in the friendship (high RI) condition would provide and receive more support than those in the stranger (low RI) condition on approach to a stress task, two independent  $t$ -tests were also conducted. To ensure any between-group differences were not due to sex differences, a series of independent  $t$ -tests were conducted.

The analytic strategy for the CVR data comprised three steps. First, as seen in previous studies using a similar protocol (e.g., Mendes et al., 2003; Turner et al., 2014) heart rate (HR) in the last (fifth) minute of baseline was compared to HR in the first minute post task instruction phase. A significant increase in heart rate indicates engagement in the task. Second, CVR scores were calculated for cardiac output (CO) and total peripheral resistance (TPR) by subtracting the raw CVR responses from the last minute of baseline from the raw CVR responses in the first minute post task instructions (Seery et al., 2009). Third, CO and TPR were combined into a single challenge and threat index as seen in similar challenge and threat research (e.g., Blascovich et al., 2004; Turner et al., 2012, 2014).

Similar to chapter four, change scores were then created for resource appraisals, anxiety, challenge and threat index, and HR by subtracting the T1 values away from the T2 values. Change scores have been considered useful in examining CVR changes between timepoints (Thorson et al., 2018).

To test whether the friend condition and the accompanying ratings of the support predicted the resource appraisals (H2) and anxiety (H3), a series of four-step multiple regressions were conducted with resource appraisal change (self-efficacy, control, or approach/avoidance goals) as the dependant variables. Sex was entered at step one of regression, T1 resource appraisal (self-efficacy, control, or approach/avoidance goals) at step 2, RI and condition entered at step three, and either received or provided (emotional, instrumental, & informational) social support were entered at step four (H2). A series of five-step multiple regressions were then conducted with anxiety change as the dependant variable. The first four steps were similar as the above with the addition of step five which included all resource appraisal change scores (H3).

To test the prediction that those in the friendship (high RI) condition would display more adaptive CVR following a support period than those in the stranger (low RI) condition

on approach to a stress task (H4), two six-step multiple regressions were conducted with challenge and threat index change and HR change as the dependant variables. The first five steps were the same as above with the addition of step six which included anxiety change.

Lastly, to examine H5 that those in friend condition (high RI) and the accompanying ratings of support along with lower anxiety, greater resource appraisals, and more adaptive CVR, would predict better performance on the speech task than those in the stranger condition (low RI), a series of six-step multiple regressions were carried out with time spoken and time until first pause as the dependant variables. Sex was entered at step 1, RI & condition at step 2, then either received or provided social support at step 3, resource appraisal change at step 4, anxiety at step 5 and challenge and threat index change and HR change at step 6.

## 5.4 Results

Table 5.1 contains descriptive statistics and bivariate correlations coefficients between all study variables. No correlation coefficient exceeded .80 among the independent variables indicating that multicollinearity was not an issue in further analysis.

### Condition checks

Significant differences were found between the two conditions, Wilks'  $\Lambda = .21$ ,  $F(4, 79) = 72.45$ ,  $p < .001$ ,  $\eta^2_p = .79$ , for how long known  $F(1, 82) = 142.21$ ,  $p < .001$ ,  $\eta^2_p = .63$ , how close  $F(1, 82) = 188.62$ ,  $p < .001$ ,  $\eta^2_p = .70$ , trust  $F(1, 82) = 128.00$ ,  $p < .001$ ,  $\eta^2_p = .61$ , and relational identity  $F(1, 82) = 107.49$ ,  $p < .001$ ,  $\eta^2_p = .57$ . Friend condition reported higher scores across all variables ( $p < .001$ ) compared with the stranger condition.

To test H1, an independent  $t$ -test revealed there was a significant difference for received support  $t(82) = 4.36$ ,  $p < .001$ , with the friend condition ( $M = 41.02$ ,  $SD = 5.94$ ) reporting higher received support than the stranger condition ( $M = 34.97$ ,  $SD = 6.75$ ); and for

provided support  $t(82) = 2.62, p = .010$ , with the friend condition ( $M = 39.76, SD = 6.77$ ) reporting higher provided support than the stranger condition ( $M = 35.63, SD = 7.67$ ).

### **Between sex differences**

Independent  $t$ -tests revealed there was no significant difference between males and females for RI, change scores of control, approach, avoidance, HR, challenge and threat index, anxiety, received emotional, received instrumental, received informational, provided emotional, provided instrumental, provided informational, or time until first pause. However, there were significant differences for self-efficacy change,  $t(82) = 2.30, p = .024$ , with males ( $M = .06, SD = .39$ ) having higher self-efficacy than females ( $M = -.15, SD = .42$ ); and total time talking,  $t(82) = 3.14, p = .002$ , with males ( $M = 219.48_{\text{secs}}, SD_{\text{secs}} = 88.30$ ) speaking for longer than females ( $M = 154.00_{\text{secs}}, SD = 102.75_{\text{secs}}$ ) on the speech task.

### **Task Engagement and Importance**

A paired samples  $t$ -test was conducted to compare the last minute of baseline HR with the first minute of the post-task instruction phase for T1 and T2, similar to previous research (e.g., Turner et al., 2014). As expected, there were a significant increase in HR for T1,  $t(60) = -6.18, p < .001$  from the fifth minute of baseline ( $M = 76.09_{\text{bpm}}, SD = 12.16_{\text{bpm}}$ ) to the first minute of the post task instruction phase ( $M = 80.34_{\text{bpm}}, SD = 13.70_{\text{bpm}}$ ), and a significant increase for T2,  $t(60) = -2.94, p = .005$  from the fifth minute of baseline ( $M = 76.01_{\text{bpm}}, SD = 12.30_{\text{bpm}}$ ) to the first minute of the post task instruction phase ( $M = 77.56_{\text{bpm}}, SD = 12.90_{\text{bpm}}$ ).<sup>1</sup> There were also high levels of perceived task importance for T1 ( $M = 5.75, SD = 1.28$ ) and T2 ( $M = 5.74, SD = 1.05$ ). Thus, these findings suggest engagement in the task and enabling the examination of challenge and threat states.

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<sup>1</sup> 23 CVR data points were missing in the data set due to measurement error.

Table 5.1 Means, Standard Deviations, and Bivariate Correlations for all key variables

N= 84	M	SD	Scales (Cronbach's alpha)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Sex	.48	.50		-	-.05	.03	.10	-.04	.03	-.12	.13	-.13	-.25*	.01	.07	-.18	-.20	-.33**	-.19
2. Relational identity	3.43	.89	1-5 (.92)		-	.65**	.69**	.88**	.04	.08	-.17	-.02	-.06	.50**	.37**	.11	.23	-.18	-.24*
3. Time known	2.68	1.47	1-5			-	.81**	.74**	.00	.03	.04	-.04	-.12	.43**	.31**	.05	.15	-.18	-.24*
4. Closeness	1.74	.81	1-4				-	.72**	.02	-.08	-.15	-.04	-.09	.43**	.30**	.10	.15	-.14	-.19
5. Trust	4.91	1.69	1-5 (.94)					-	.03	.10	-.12	.02	-.17	.50**	.32**	.11	.17	-.22*	-.25*
6. Anxiety change	-.08	8.17	1-4 (T1= .91, T2 = .96)						-	-.17	-.11	.26*	-.41**	-.06	-.03	-.13	-.03	.02	.00
7. Control change	.06	.68	1-5							-	.02	.06	.26*	.20	.06	-.15	-.11	.00	-.09
8. Approach change	-.14	.54	1-7								-	.01	.07	-.06	.19	-.03	.03	-.03	-.03
9. Avoidance change	-.18	.86	1-7									-	-.10	-.07	-.05	.06	.23	.16	.23
10. Self- efficacy change	-.04	.42	1-4 (T1=.90, T2 = .95)										-	.10	.25*	-.05	.05	.26*	.16
11. Received support	38.29	6.98	1-4 (.89)											-	.61**	-.10	.06	-.10	-.20
12. Provided Support	37.89	7.44	1-4 (.85)												-	.10	.10	.05	.00
13. Challenge & Threat index change	.07	1.79	+ value = challenge - value = threat													-	.64**	.08	.15
14. Heart rate change	-2.67	5.25	Bpm														-	-.09	-.05
15. Time spoken on task	188.30	100.52	seconds															-	.84**
16. Time until first pause	146.06	96.47	seconds																-

Note: \*  $p < .05$ , \*\*  $p < .01$ . Male coded at 0, female coded at 1

Table 5.2 Means and Standard Deviations across the conditions

N= 84 Friend (n= 46; males= 24, females= 22) Stranger (n=38; males= 20, females= 18)	Condition (T1)				Condition (T2)				Condition (change)			
	Friend		Stranger		Friend		Stranger		Friend		Stranger	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Relational identity	4.03	.55	3.43	.89								
Time known	3.74	1.00	1.40	.75								
Closeness	2.35	.60	1.00	.00								
Trust	6.10	.87	3.47	1.25								
Anxiety	44.13	14.41	40.63	10.70	44.61	14.43	40.37	13.26	.48	9.93	-.27	6.42
Control	3.42	.89	3.63	.89	3.48	.93	3.63	.85	.06	.73	.03	.61
Approach	5.00	1.21	5.22	1.22	4.73	1.23	5.07	1.18	-.21	.64	-.13	.47
Avoidance	4.70	1.44	4.47	1.41	4.50	1.58	4.18	1.25	-.16	.89	-.27	.84
Self- efficacy	3.25	.74	3.51	.61	3.11	.93	3.53	.83	-.10	.43	.01	.44
Received emotional					27.65	4.18	25.33	4.31				
Received instrumental					7.29	2.15	6.13	2.22				
Received informational					5.29	1.13	3.80	.10				
Provided emotional					32.61	8.49	31.30	7.62				
Provided instrumental					7.65	2.20	6.10	1.95				
Provided informational					4.61	1.23	4.10	1.21				
Challenge & threat index	-.13	1.85	.00	1.50	.09	1.49	-.14	1.70	.22	1.73	-.09	1.86
Heart rate change	4.49	4.77	3.84	5.34	2.44	3.91	.55	3.83	-1.93	4.14	-3.44	6.17
Time spoken on task					163.65	103.21	212.47	98.36				
Time until first pause					118.39	87.51	167.57	101.80				

### Predicting change in resource appraisals

**Self-efficacy.** Sex at step one accounted for a significant proportion of the variance,  $F(1, 83) = 5.29, p = .024, R^2 = .06, R^2_{Adjusted} = .49$ . Adding condition and RI at step three did not contribute significantly to the regression model,  $F(4, 83) = 1.53, p = .201, R^2 = .07$ . Received support at step four did not account for significant proportion,  $F(7, 83) = 1.89, p = .084, R^2 = .15, R^2_{Adjusted} = .07$ , but it did for provided support,  $F(7, 83) = 2.79, p = .012, R^2 = .20, R^2_{Adjusted} = .13$ . Standardised coefficients revealed only sex ( $\beta = -.31, p = .007$ ), and provided emotional support ( $\beta = .31, p = .037$ ) were significant predictors of self-efficacy

change. In sum, being male and having an increase in provided emotional support were related to greater self-efficacy.

**Control.** Sex did not account for a significant proportion of the variance,  $F(1, 83) = 1.17, p = .282, R^2 = .01, R^2_{\text{Adjusted}} = .00$ . Adding condition and RI at step three did account for a significant proportion of the variance,  $F(4, 83) = 8.29, p < .001, R^2 = .30$ . Received and provided support at step four also accounted for a significant proportion of the variance (Received:  $F(7, 83) = 6.622, p < .001, R^2 = .38, R^2_{\text{Adjusted}} = .32$ ; Provided:  $F(7, 83) = 4.86, p < .001, R^2 = .31, R^2_{\text{Adjusted}} = .25$ ). Standardised coefficients revealed that sex (Received;  $\beta = -.24, p = .012$ ; Provided  $\beta = -.29, p = .006$ ), T1 control (Received;  $\beta = -.56, p < .001$ ; Provided  $\beta = -.58, p < .001$ ) and received emotional support ( $\beta = .47, p = .002$ ) were significant predictors of control change. In sum, being male and having an increase of received emotional support were related to greater perceived control.

**Approach and Avoidance.** For approach, sex, did not account for a significant amount of variance  $F(1, 83) = 1.46, p = .230, R^2 = .02, R^2_{\text{Adjusted}} = .00$ . Adding RI and condition at step three also did not account for a significant proportion of the variance,  $F(4, 83) = 2.13, p = .084, R^2 = .10$ . While adding received support did not account for a significant proportion of the variance  $F(7, 83) = 1.42, p = .211, R^2 = .12, R^2_{\text{Adjusted}} = .03$ , provided support at step four did  $F(7, 83) = 2.40, p = .028, R^2 = .18, R^2_{\text{Adjusted}} = .11$ . Standardised coefficients revealed only T1 approach ( $\beta = -.24, p = .035$ ) and provided instrumental support ( $\beta = .37, p = .020$ ) were significant predictors of approach change. In sum, an increase in instrumental support were related to greater approach goal focus.

For avoidance, sex did not account for a significant amount of variance  $F(1, 83) = 1.40, p = .241, R^2 = .02, R^2_{\text{Adjusted}} = .01$ . While RI and condition at step three were significant,  $F(4, 83) = 3.43, p = .12, R^2 = .15$ . Adding the received support did not account for a significant proportion of variance  $F(7, 83) = 2.05, p = .059, R^2 = .16, R^2_{\text{Adjusted}} = .08$ , while



provided support at step four did  $F(7, 83) = 2.27, p = .037, R^2 = .17, R^2_{\text{Adjusted}} = .10$ .

Standardised coefficients revealed only T1 approach ( $\beta = -.37, p = .002$ ) were a significant predictor of avoidance change. In sum, avoidance could not be predicted by any of the other variables.

### **Predicting change in anxiety**

Sex at step one  $F(1, 83) = .08, p = .784, R^2 = .00, R^2_{\text{Adjusted}} = -.01$ , condition and RI at step three  $F(4, 83) = 1.14, p = .345, R^2 = .08$ , and received  $F(7, 83) = .99, p = .442, R^2 = .08$  and provided support  $F(7, 83) = 1.04, p = .414, R^2 = .09$  at step four did not account for significant proportion of the variance. Adding resource appraisal change at step five did account for a significant proportion of the variance (Received:  $F(11, 83) = 3.41, p = .001, R^2 = .34, R^2_{\text{Adjusted}} = .24$ ; Provided:  $F(11, 83) = 3.30, p = .001, R^2 = .34, R^2_{\text{Adjusted}} = .23$ ).

Standardised coefficients revealed that only T1 anxiety (Received;  $\beta = -.43, p = .001$ ; Provided  $\beta = -.41, p = .002$ ) and self-efficacy change (Received;  $\beta = -.50, p < .001$ ; Provided  $\beta = -.50, p < .001$ ) were significant predictors of anxiety change. In sum, a decrease in self-efficacy were related to an increase in anxiety.

### **Predicting challenge and threat index and HR change**

For challenge and threat index, sex at step one,  $F(1, 60) = 2.00, p = .162, R^2 = .03, R^2_{\text{Adjusted}} = .02$  did not account for significant proportion of the variance. Adding condition and RI at step three  $F(4, 60) = 9.40, p < .001, R^2 = .40$ , received  $F(7, 60) = 6.34, p < .001, R^2 = .46$ , and provided  $F(7, 60) = 5.23, p < .001, R^2 = .41$ , at step four, resource appraisal at step five (Received:  $F(11, 60) = 4.12, p < .001, R^2 = .48$ ; Provided:  $F(11, 60) = 3.52, p = .001, R^2 = .44$ ), and anxiety at step six (Received:  $F(12, 60) = 3.87, p < .001, R^2 = .49, R^2_{\text{Adjusted}} = .37$ ; Provided:  $F(12, 60) = 3.25, p = .002, R^2 = .45, R^2_{\text{Adjusted}} = .31$ ) did account for significant proportion of the variance. Standardised coefficients revealed that only T1 index (Received;

$\beta = -.67, p < .001$ ; Provided  $\beta = -.64, p < .001$ ) were a significant predictor of index change. In sum, challenge and threat index could not be predicted by any of the other variables.

Results are similar for HR change, sex at step one,  $F(1, 60) = 2.35, p = .131, R^2 = .04, R^2_{\text{Adjusted}} = .02$  did not account for significant proportion of the variance. Adding condition and RI at step three  $F(4, 60) = 19.29, p < .001, R^2 = .58$ , received  $F(7, 60) = 11.17, p < .001, R^2 = .60$ , and provided  $F(7, 60) = 11.57, p < .001, R^2 = .61$ , at step four, resource appraisal at step five (Received:  $F(11, 60) = 7.05, p < .001, R^2 = .61$ ; Provided:  $F(11, 60) = 7.40, p < .001, R^2 = .62$ ), and anxiety at step six (Received:  $F(12, 60) = 6.34, p < .001, R^2 = .61, R^2_{\text{Adjusted}} = .52$ ; Provided:  $F(12, 60) = 6.65, p < .001, R^2 = .62, R^2_{\text{Adjusted}} = .53$ ) did account for significant proportion of the variance. Standardised coefficients revealed that only T1 HR (Received;  $\beta = -7.41, p < .001$ ; Provided  $\beta = -7.46, p < .001$ ) were a significant predictor of HR change. In sum, change in HR could not be predicted by any of the other variables.

### **Predicting time spoken on task and time until first pause**

For total talking time, sex at step one  $F(1, 60) = 9.62, p = .003, R^2 = .14, R^2_{\text{Adjusted}} = .13$ , condition and RI at step two  $F(3, 60) = 5.36, p = .003, R^2 = .22$ , and received  $F(6, 60) = 4.43, p = .001, R^2 = .33$  and provided support  $F(6, 60) = 3.47, p = .006, R^2 = .28$  at step three accounted for a significant proportion of the variance. Only when received support was in the model did resource appraisal at step four (Received:  $F(10, 60) = 2.51, p = .016, R^2 = .33$ ; Provided:  $F(10, 60) = 1.98, p = .056, R^2 = .28$ ), and anxiety at step five (Received:  $F(11, 60) = 2.44, p = .016, R^2 = .35$ ; Provided:  $F(11, 60) = 1.94, p = .057, R^2 = .30$ ) account for a significant proportion of the variance. Challenge and threat index change and HR change at step six were significant (Received:  $F(13, 60) = 2.31, p = .018, R^2 = .39, R^2_{\text{Adjusted}} = .22$ ; Provided:  $F(13, 60) = 2.04, p = .037, R^2 = .36, R^2_{\text{Adjusted}} = .18$ ). Standardised coefficients revealed that sex (Received;  $\beta = -.36, p = .006$ ; Provided  $\beta = -.40, p = .004$ ), received emotional ( $\beta = .43, p = .038$ ), received instrumental support ( $\beta = -.42, p = .038$ ), along with

HR change (when provided support was in the model;  $\beta = -.33, p = .047$ ) were significant predictors of total talk time. In sum, being male and having an increase of received emotional support and a decrease of received instrumental support, along with a decrease in HR were related to an increase in total talk time.

For time until first pause, sex at step one,  $F(1, 60) = 1.88, p = .18, R^2 = .03, R^2_{\text{Adjusted}} = .01$ , and condition and RI at step two did not contribute significantly to the regression model,  $F(3, 60) = 2.27, p = .090, R^2 = .11$ . Received and provided support entered at step three accounted for a significant proportion of the variance when received was in the model,  $F(6, 60) = 2.94, p = .015, R^2 = .25$ , but not provided  $F(6, 60) = 1.49, p = .199, R^2 = .14$ . Resource appraisals at step four (Received:  $F(10, 60) = 1.93, p = .063, R^2 = .28$ ; Provided:  $F(10, 60) = .89, p = .550, R^2 = .15$ ), anxiety change at step five (Received:  $F(11, 60) = 1.76, p = .088, R^2 = .28$ ; Provided:  $F(11, 60) = .84, p = .602, R^2 = .16$ ), and challenge and threat index change and HR change at step six (Received:  $F(13, 60) = 1.70, p = .093, R^2 = .32, R^2_{\text{Adjusted}} = .13$ ; Provided:  $F(13, 60) = .98, p = .484, R^2 = .21, R^2_{\text{Adjusted}} = -.004$ ) did not account for a significant proportion of the variance. In sum, the time until first pause could not be predicted by any of the other variables.

## 5.5 Discussion

In line with H1 those in the friendship (high RI) condition provided and received more support than those in the stranger (low RI) condition on approach to the stress task. The findings provided partial support for H2, in that provided emotional support was positively associated with increases in self-efficacy and provided instrumental support was positively associated with approach. It was also found that received emotional support was positively associated with control suggesting that types of social support can influence resource appraisals in line with challenge and threat. Sex was further related to self-efficacy and control which, according to the direction, may suggest that males felt more confident and

in control towards the task following the preparation time. For H3, only self-efficacy came out as negatively associated with anxiety suggesting the as self-efficacy increases, anxiety decreases, on approach to the task. No associations were found between the variables and the challenge and threat index change and HR change therefore rejecting H4. Although, observing the challenge and threat index contains meaningful information, as values closer to +1 are associated with a challenge state, whereas values closer to -1 are associated with threat state. In this regard, inspection of the change scores for the challenge and threat index reveals that those in the friend condition were closer to a challenge state, while those in the stranger condition were closer to the threat state following the dyad preparation period. This is in line with the original hypothesis (H4), though interpretation should be treated with caution. In terms of performance and H5, males spoke for longer than females on the speech task. Further, males with greater received emotional support and lower received instrumental support and HR, related with greater time spoken on the task. This suggests that emotional support rather than instrumental support may be more beneficial to performance on the speech task, though further research is needed to establish causation of these relationships.

The current findings coupled with those in earlier chapters of the thesis highlight some positive associations with social support and social/relational identification on increasing challenge and threat resource appraisals and improved performance outcomes. To build and extend the current work, the next study in this chapter aims to further explore the role of these social factors in the stress response in a couple of ways. First, it was unclear in the present study the true extent and nature of the interaction between the dyads in the preparation period before the task. As such, study 2 addressed this by observing the nature and quality of the support being provided by the participants during the preparation period. Second, past researchers have also shown that no support may be beneficial in the face of a stressful task, as support from others may actually increase CVR (e.g., Anthony & O'Brien,

1999; Hilmert, Christenfeld, et al., 2002). In addition, results in chapter four found that when given a choice of a support condition, almost half of participants selected to prepare alone on approach to a hypothetical stress task. Thus, study 2 adopted a similar design to study 1 but included an alone condition for comparison.

## 5.6 Study 2

Study 2 adopted a between-participant design including the three support conditions seen in chapter four: (1) those who received social support from a friend (friend condition: high RI); (2) support from someone they do not know (stranger condition: low RI); and (3) no support from anyone (alone condition: no RI), when preparing for an acute stress task. In chapter four, participants chose their preference of either preparing with a friend, someone they did not know, or prepare alone. In contrast, in the current study participants were randomly assigned to one of the three conditions. As in study 1, those assigned to the friend condition were asked to recruit one of their best same-sex friends, who agreed to accompany and participate in the study. Those who were assigned to the stranger condition were matched with a same-sex partner by the researcher. To further extend and add to the previous research in the thesis, study 2 examined the interaction between the dyads to gain a greater understanding of the types of support being provided, as support matching may be important to achieve desired effects in the face of varying stressors (Cutrona & Russell, 1990; Rees & Hardy, 2004). It was also important to consider other factors that may influence the dynamic between social factors and the stress response, one example being personality. Not only was personality a predispositional factor put forth by the Lazarusian notion of cognitive appraisal, but personality has been shown to influence challenge and threat appraisals (e.g., Allen et al., 2012; Gallagher, 1990) and social support (e.g., Swickert, 2012; Swickert et al., 2010; Udayar et al., 2020) as such, personality will be measured in the current study.

Similar to and based on study 1 findings, it was also hypothesized that the friend condition (high RI) will report greater self-efficacy, control, approach goals, and lower avoidance goals compared to those in the stranger (low RI) condition and alone condition (no RI) on approach to a stress task (H1). It was further predicted those in the friendship (high RI) condition will report less anxiety (H2), will provide and receive more support (H3), perform better on the task (H4), and display more adaptive CVR (H5), than those in the stranger (low RI) condition and the alone (no RI) condition. In addition, based on the findings from study 1, it was also of interest to examine sex differences across the self-report CVR, and performance measures.

## 5.7 Method

### 5.7.1 Participants

A total of 89 (male = 50, female = 39) participants ( $M_{\text{age}} = 22.45$ ,  $SD_{\text{age}} = 5.73$  years) took part in the study. The participants were university students and assigned to one of three conditions: alone ( $N = 31$ , male = 18, female = 13), friend ( $N = 30$ , male = 16, female = 14), and stranger ( $N = 28$ , male = 16, female = 12). No participants reported suffering from any mental health issues related to stress or taking any medication with cardiovascular effects. Ethical approval was granted from an institutional ethics panel and individual informed consent was obtained prior to data collection. With a power of .8 and an alpha of .05, a target sample of 57 was deemed sufficient to detect a medium effect ( $f = .25$ ) according to an a priori calculation using G\*Power for a MANOVA analysis.

### 5.7.2 Measures

Similar to study 1, CVR data was recorded along with self-report measures of relational identity (RI), relationship quality and trust, anxiety, achievement goals, self-efficacy, perceived control, and social support. In addition, personality was also measured using The Big Five Inventory-2 (Soto & John, 2017), a revision of the Big Five Inventory

(BFI; John et al., 1991). The inventory has 60 questions where participants rate to what extent they 1 (*disagree*) to 5 (*agree strongly*) with a series of statements. Cronbach's alpha ( $\alpha$ ) for all measures can be seen in table 5.3.

The stress task was also identical to that in study 1 along with the performance measures. However, additional data was collected on the interaction between the participants during their support interactions (friend and stranger conditions). The 5-minute preparation time was video recorded, and the support was measured:

***Social support behavioural analysis.*** Three authors who were independent of the collection of data, and unaware of the conditions scored the interaction videos for verbal social support. For each interaction video ( $n=28$ )<sup>2</sup>, the reviewers watched the video twice all the way through before scoring each participant based on adapted versions of the BSSS (Schulz & Schwarzer, 2003) to assess the provided support given from each participant. A moderate degree of reliability (LeBreton & Senter, 2008) were found between the reviewers, as the average measure Intraclass Correlation Coefficient (ICC) were .798 for emotional, .646 for instrumental, and .629 for informational support. Mean scores were then created across the reviewers for the three sources of support emotional, instrumental, and informational support.

### **5.7.3 Procedure**

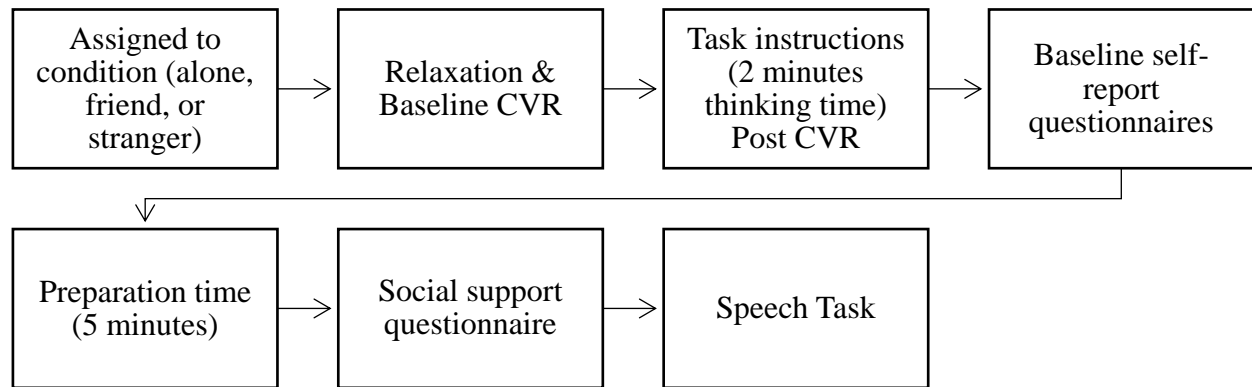
The procedure was also similar to study 1. However, there was only a single CVR data collection point to test physiological indices closer to the actual performance on the task and to reduce participant burden. Self-report measures of personality, resource appraisals and anxiety towards the task were also taken. Once completed the measures, participants then had 5 minutes to prepare, after which those in the dyad conditions completed the social support questionnaire before finally performing the speech task individually (as in study 1). The

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<sup>2</sup> One interaction video (Friend condition) was missing due to recording issues

social support interaction within the dyads was also video recorded and assessed by independent reviewers for provided social support. See figure 5.2 for schematic representation of the data collection protocol.

Figure 5.2 An overview of the data collection protocol for study 2



#### 5.7.4 Analytic strategy

Data were first examined for outliers and normality to ensure data met the assumptions for parametric testing. Significant outliers with  $z$  scores greater than two were winsorized (Salkind et al., 2010; Smith, 2014). Overall, 4.11% of the data were winsorized. In order to assess the strength and validity of the conditions, a MANOVA were carried out to examine relational identity, quality, and trust between the three conditions. To test H1, a 2 (sex) X 3 (conditions) MANCOVA were also conducted to assess differences between sex and the conditions across the self-reported resource appraisals accounting for personality. Next, to test H2, a 2 (sex) X 3 (conditions) ANCOVA were computed to examine differences between sex and the conditions in anxiety, while accounting for personality. Then, to test H3 and H4, a series of 2 (sex) X 3 (conditions) MANCOVA's were also conducted to assess for any differences between sex and the conditions for social support (H3) and task performance (H4), while accounting for personality. The analytic strategy for the CVR data comprised of three steps as seen in study 1 to create a challenge and threat index score and HR change score, which was created by subtracting HR in the last (fifth) minute of baseline from HR in



the first minute post task instruction phase. As such, to test H5, a series of 2 (sex) X 3 (conditions) ANCOVA's were computed to examine differences between sex and the conditions across the challenge and threat index and HR change accounting for personality.

## 5.8 Results

Table 5.3 and Table 5.4 contain descriptive statistics and bivariate correlations coefficients between all study variables. No correlation coefficient exceeded .80 among the independent variables indicating that multicollinearity was not an issue in further analysis.

### Condition checks

The MANOVA revealed there was a significant difference between the friend and stranger conditions, Wilks'  $\Lambda = .074$ ,  $F(4, 53) = 166.12$ ,  $p < .001$ ,  $\eta^2_p = .93$ . Results revealed a significant difference between friend and stranger conditions on how long known  $F(1, 57) = 373.64$ ,  $p < .001$ ,  $\eta^2_p = .87$ , how close  $F(1, 57) = 255.38$ ,  $p < .001$ ,  $\eta^2_p = .82$ , trust  $F(1, 57) = 78.88$ ,  $p < .001$ ,  $\eta^2_p = .59$ , and relational identity  $F(1, 57) = 58.82$ ,  $p < .001$ ,  $\eta^2_p = .51$ . Friend condition reported higher scores across all variables ( $p < .001$ ) compared with the stranger condition.

Post-hoc Bonferroni pairwise comparisons showed that the friend condition reported significantly higher scores on how long they have known the other person for ( $M = 4.33$ ,  $SD = .80$ ), compared with those in the stranger condition ( $M = 1.14$ ,  $SD = .36$ ), higher scores on how close they were to the other person ( $M = 2.50$ ,  $SD = .51$ ), compared to those in the stranger condition ( $M = 1.00$ ,  $SD = .00$ ), higher levels of trust ( $M = 6.10$ ,  $SD = .83$ ), than in the stranger condition ( $M = 3.76$ ,  $SD = 1.12$ ), and higher levels of relational identity ( $M = 4.10$ ,  $SD = .62$ ), compared to those in the stranger condition ( $M = 2.81$ ,  $SD = .66$ ). In sum, this provides support for the strength and validity of the conditions created.

### Resource appraisals

The MANCOVA revealed there was a non-significant interaction effect between sex and condition Wilks'  $\Lambda = .94$ ,  $F(8, 150) = .60$ ,  $p = .77$ ,  $\eta^2_p = .03$ . There was also a non-significant main effect for sex Wilks'  $\Lambda = .89$ ,  $F(4, 75) = 2.31$ ,  $p = .07$ ,  $\eta^2_p = .11$ , and condition Wilks'  $\Lambda = .92$ ,  $F(8, 150) = .84$ ,  $p = .57$ ,  $\eta^2_p = .04$ . In sum, there was no significant differences between sex and the conditions accounting for personality across the self-reported resource appraisals.

### **Anxiety**

The two-way ANCOVA revealed a non-significant interaction effect between sex and condition,  $F(2, 78) = 3.05$ ,  $p = .053$ ,  $\eta^2_p = .07$ . There was also a non-significant main effect for condition  $F(2, 78) = 2.11$ ,  $p = .13$ ,  $\eta^2_p = .05$ . There was a significant main effect for sex  $F(1, 78) = 4.14$ ,  $p = .045$ ,  $\eta^2_p = .05$ . Post-hoc Bonferroni pairwise comparisons showed that females reported significantly ( $p = .045$ ) higher anxiety scores ( $M = 47.66$ ,  $SD = 8.95$ ) than males ( $M = 43.74$ ,  $SD = 8.18$ ). In sum, there was no significant differences between the conditions accounting for personality across the self-reported resource appraisals, but sex differences emerged, with females reporting higher anxiety than males on approach to the stress task.

Table 5.3 Means, Standard Deviations, and Bivariate Correlations for all variables

N= 89	M	SD	Scales (Cronbach's alpha)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Sex	.44	.50		-	.30*	.09	.10	.18	.10	.25*	.07	.09	.07	.23*	-.09	-.08	.28**	-.18	.28*	.33*	.24*	.26*	-.23*	.07
2. Relational identity	3.47	.91	1-5 (.90)		-	.69**	.73**	.90**	.17	.18	.03	.09	-.25	-.02	.05	.01	.19	-.08	.58**	.46**	-.03	.01	-.05	-.03
3. Time known	2.79	1.72	1-5			-	.83**	.72**	.17	-.03	.16	.03	-.27*	.15	.12	-.01	.11	-.09	.35**	.16	-.02	-.03	-.18	-.12
4. Closeness	1.79	.85	1-4				-	.80**	.14	-.07	.17	.03	-.31*	.08	.12	.07	.13	-.12	.34**	.23	-.05	-.07	-.08	-.03
5. Trust	4.95	1.51	1-5 (.94)					-	.10	.16	.06	.13	-.23	-.01	.00	.07	.16	-.12	.55**	.44**	-.03	-.03	-.01	-.01
6. Extraversion	46.58	4.52	1-5 (.70)						-	.07	.28**	-.00	.40**	-.27*	.19	.21	-.01	.32**	.09	.08	-.10	-.01	.02	.13
7. Agreeableness	49.75	4.23	1-5 (.71)							-	.32**	.05	.13	.10	-.08	.01	.08	.05	.31*	.29*	-.02	.05	.25*	-.17
8. Conscientiousness	47.66	4.25	1-5 (.65)								-	-.13	.33**	-.10	.11	-.00	-.04	.26*	.08	.20	.08	.05	.13	-.03
9. Negative emotionality	40.33	4.86	1-5 (.67)									-	.07	.18	-.24*	-.08	.19	-.26*	.11	.07	-.11	-.07	.60	.07
10. Open Mindedness	44.76	4.99	1-5 (.71)										-	-.06	-.09	-.05	.03	.07	-.01	-.01	-.10	-.06	.01	.02
11. Anxiety	45.46	8.70	1-4 (.91)											-	-.28**	-.22*	.26*	-.50**	-.06	-.14	.13	.00	-.18	-.05
12. Control	3.60	.86	1-5												-	.09	-.15	.42**	.08	.18	-.03	-.06	.28**	-.04
13. Approach	5.28	1.11	1-7													-	.20	.46**	-.11	.00	-.12	-.13	-.12	.11
14. Avoidance	4.42	1.21	1-7														-	-.13	.14	.12	.12	.05	-.38**	.07
15. Self- efficacy	3.48	.59	1-4 (.86)															-	-.18	.09	-.19	-.08	.18	.03
16. R_ support	36.41	8.18	1-4 (.89)																-	.73**	-.10	-.05	.07	-.13
17. P_ support	36.93	7.03	1-4 (.85)																	-	.11	.14	.25	-.06
18. Challenge & threat index	-.06	1.57	Bpm																		-	.77**	-.04	.04
19. Heart rate	4.59	5.77	seconds																			-	-.03	.12
20. Time spoken on task	229.35	84.43	seconds																				-	-.09
21. Time until first pause	86.13	89.96	Bpm																					-

Note: \*  $p < .05$ , \*\*  $p < .01$ . Male coded at 0, female coded at 1

Table 5.4 Means and Standard Deviations across the conditions for key variables

N= 89						
Alone (n= 31; males= 18, females= 13)						
Friend (n= 30; males= 16, females= 14)						
Stranger (n=28; males= 16, females= 12)						
	Alone		Friend		Stranger	
	M	SD	M	SD	M	SD
Relational identity			4.10	.62	2.81	.66
Time known			4.33	.80	1.14	.36
Closeness			2.53	.51	1.00	.00
Trust			6.06	.84	3.76	1.12
Extraversion	47.42	4.57	46.60	4.72	45.64	4.20
Agreeableness	49.42	4.02	49.73	4.31	50.14	4.49
Conscientiousness	47.90	4.34	48.20	4.08	46.82	4.35
Negative emotionality	40.42	4.55	40.30	4.72	40.25	5.47
Open mindedness	45.06	5.67	43.13	4.46	46.18	4.36
Anxiety	43.61	7.87	47.63	8.78	45.18	9.25
Control	3.55	.77	3.73	.83	3.50	1.00
Approach	5.26	.91	5.27	1.18	5.30	1.27
Avoidance	4.27	1.31	4.62	1.08	4.38	1.23
Self- efficacy	3.46	.45	3.41	.65	3.58	.67
Received emotional			26.17	4.11	23.79	5.22
Received instrumental			7.57	2.19	5.86	2.19
Received informational			5.13	1.22	4.14	1.80
Provided emotional			27.00	4.08	25.90	4.71
Provided instrumental			7.23	1.74	6.71	1.63
Provided informational			5.10	1.09	4.68	1.16
Challenge & threat index	-0.09	1.70	-0.00	1.61	-0.07	1.42
Heart rate	5.64	5.36	4.54	5.28	4.21	5.71
Time spoken on task	222.10	76.62	224.83	94.00	242.21	83.44
Time until first pause	98.26	76.86	65.43	79.40	94.90	111.02

Note: \*  $p < .05$ , \*\*  $p < .01$ . Male coded at 0, female coded at 1.

## Social Support

**Received.** The MANCOVA revealed there was a non-significant interaction effect between sex and condition Wilks'  $\Lambda = .99$ ,  $F(3, 47) = .14$ ,  $p = .94$ ,  $\eta^2_p = .01$ . There was also a non-significant main effect for sex Wilks'  $\Lambda = .94$ ,  $F(3, 47) = .96$ ,  $p = .42$ ,  $\eta^2_p = .06$ . There was a significant main effect for condition Wilks'  $\Lambda = .85$ ,  $F(3, 47) = 2.83$ ,  $p = .048$ ,  $\eta^2_p = .15$ . Post-hoc Bonferroni pairwise comparisons showed that friend condition reported significantly ( $p =$

.020) higher emotional support scores ( $M = 26.17$ ,  $SD = 4.11$ ) than stranger condition ( $M = 23.79$ ,  $SD = 5.22$ ), higher ( $p = .006$ ) instrumental support scores ( $M = 7.57$ ,  $SD = 2.19$ ) than stranger condition ( $M = 5.86$ ,  $SD = 2.19$ ), and higher ( $p = .033$ ) informational support scores ( $M = 5.13$ ,  $SD = 1.22$ ) than stranger condition ( $M = 4.14$ ,  $SD = 1.80$ ). In sum, there was no significant differences between sex accounting for personality for received support, but differences between conditions emerged revealing those in the friend condition reported higher emotional, instrumental, and informational support compared with the stranger condition.

**Provided.** The MANCOVA revealed there was a non-significant interaction effect between sex and condition Wilks'  $\Lambda = .95$ ,  $F(3, 47) = .80$ ,  $p = .502$ ,  $\eta^2_p = .05$ . There was also a non-significant main effect for sex Wilks'  $\Lambda = .86$ ,  $F(3, 47) = 2.54$ ,  $p = .067$ ,  $\eta^2_p = .14$ , and for condition Wilks'  $\Lambda = .98$ ,  $F(3, 47) = .39$ ,  $p = .758$ ,  $\eta^2_p = .03$ . In sum, there was no significant differences between sex and the conditions accounting for personality for provided support.

### **Social support video behavioural analysis**

The MANCOVA revealed there was a non-significant interaction effect between sex and condition Wilks'  $\Lambda = .97$ ,  $F(3, 45) = .49$ ,  $p = .692$ ,  $\eta^2_p = .03$ . There was also a non-significant main effect for sex Wilks'  $\Lambda = .89$ ,  $F(3, 45) = 1.92$ ,  $p = .141$ ,  $\eta^2_p = .11$ , and for condition Wilks'  $\Lambda = .89$ ,  $F(3, 45) = 1.76$ ,  $p = .168$ ,  $\eta^2_p = .11$ . In sum, there was no significant differences between sex and the conditions accounting for personality for the social support video analysis.

### **Task Performance**

The MANCOVA revealed there was a non-significant interaction effect between sex and condition Wilks'  $\Lambda = .96$ ,  $F(4, 154) = .89$ ,  $p = .475$ ,  $\eta^2_p = .02$ . There was also a non-significant main effect for condition Wilks'  $\Lambda = .94$ ,  $F(4, 154) = 1.18$ ,  $p = .32$ ,  $\eta^2_p = .03$ . There was a significant main effect for sex Wilks'  $\Lambda = .89$ ,  $F(2, 77) = 4.68$ ,  $p = .012$ ,  $\eta^2_p = .11$ . Post-hoc

Bonferroni pairwise comparisons revealed significant differences in total time talking ( $p = .004$ ), showing males spoke for longer (seconds) on the task ( $M = 246.08$ ,  $SD = 78.86$ ) than females ( $M = 207.90$ ,  $SD = 87.44$ ). No significant differences were revealed for time until first pause ( $p = .332$ ). In sum, there was no significant differences between the conditions accounting for personality for task performance, but sex differences emerged, with males speaking for longer on the task than females (indicating better performance), no differences were found for time until first pause.

### **Task Engagement and Importance**

A paired samples  $t$ -test was conducted to compare the last minute of baseline HR with the first minute of the post-task instruction phase, similar to previous research (e.g., Turner et al., 2014). As expected, there was a significant increase in HR,  $t(88) = -7.71$ ,  $p < .001$  from the fifth minute of baseline ( $M = 74.00$  bpm,  $SD = 9.30$  bpm) to the first minute of the post task instruction phase ( $M = 78.80$  bpm,  $SD = 11.51$  bpm).

There were also high levels of perceived task importance towards the task ( $M = 5.89$ ,  $SD = 1.03$ ). Thus, these findings suggest engagement in the task and enabling the examination of challenge and threat states.

### **Challenge and Threat Index and HR change**

A two- way ANCOVA revealed a non-significant interaction effect between sex and condition,  $F(2, 78) = .50$ ,  $p = .610$ ,  $\eta^2_p = .01$ . There was also a non-significant main effect for condition,  $F(2, 78) = .05$ ,  $p = .947$ ,  $\eta^2_p = .001$ . However, there was a significant main effect for sex,  $F(1, 78) = 6.63$ ,  $p = .012$ ,  $\eta^2_p = .08$ . Post-hoc Bonferroni pairwise comparisons showed that females reported significantly ( $p = .012$ ) higher challenge and threat index scores ( $M = .36$ ,  $SD = 1.71$ ) than males ( $M = -.38$ ,  $SD = 1.39$ ).

Results are similar for HR change, a two- way ANCOVA revealed a non-significant interaction effect between sex and condition,  $F(2, 78) = .59, p = .554, \eta^2_p = .02$ . There was also a non-significant main effect for condition,  $F(2, 78) = .90, p = .411, \eta^2_p = .02$ . However, there was a significant main effect for sex,  $F(1, 78) = 9.13, p = .003, \eta^2_p = .11$ . Post-hoc Bonferroni pairwise comparisons showed that females reported significantly ( $p = .003$ ) higher HR change scores ( $M = 6.66, SD = 5.84$ ) than males ( $M = 3.38, SD = 4.63$ ). In sum, there was no significant differences between the conditions accounting for personality for challenge and threat index and HR change, but sex differences emerged with females displaying CVR indicative of a challenge response, compared to males who displayed CVR indicative of a threat response on approach to the stress task. Females also had higher HR change scores than males, suggesting greater increases in HR post task instructions compared to baseline.

## 5.9 Discussion

Building from study 1, study 2 included the addition of an alone condition for comparison. Findings from study 2 revealed no differences between resource appraisals across conditions and sex (H1). These findings were not surprising as we did not manipulate these directly as measures were completed before the speech preparation. Although this suggests that knowing that you were potentially going to be supported from either a friend or stranger or receive no support on approach to a stressful task, is not sufficient to alter self-report resources appraisals. There were also no differences in anxiety between the conditions thus not in support of H2. Although, females did report higher anxiety than males which is similar to past research (e.g., McLean & Anderson, 2009). In support of H3 and similar to study 1, the friend condition received more informational, instrumental and emotional support than stranger condition. However, no significant differences were found for provided support. Unique to the study was

the social support behavioural analysis which despite revealing no differences across the conditions or sex, does provide a different perspective on individuals psychological experience. It may be that social support behaviours may be too subtle to observe (Thorson et al., 2018). For performance, no differences were found between conditions, but males spoke for longer on the task than females which was also seen within study 1 and in line with H4. No differences were found for CVR between the conditions therefore rejecting H5. Though, sex differences were found with females displaying responses indicative of a challenge state and higher HR change, compared with males who displayed a more threatened responses and less HR change. This suggests females displayed more adaptive CVR on approach to the task compared with males (H5).

### **5.10 General Discussion**

The aim of the current chapter was to address the second and third aims of the thesis by examining the effect of relational identification (RI) and social support on cardiovascular reactivity (CVR) on approach to an acute stress task across two studies. Across both studies there was a strong positive correlation between relational identification and social support. There was also evidence in study 1 of these social factors having a relationship with resource appraisals in line with the TCTSA. No significant differences or relationships were found between CVR and the support conditions, suggesting CVR was not influenced by RI. Sex differences did emerge with females displaying CVR indicative of a challenge response and greater HR change (study 2) compared to males who displayed a more threatened response towards the stress task and less HR change. Females did however report feeling more anxious in both studies, less confident and less in control following the preparation period (study 1) than males on approach towards the



stress task. This was reflected in the measure of performance, as males spoke for longer on the speech task compared to females across both studies.

These studies are among the first to examine relational identification and social support in line with challenge and threat theory which offers a novel contribution to the literature. By exploring how social factors can link to established stress theory (i.e., TCTSA), this advances the understanding of the transactional model of the stress response and accompanying appraisal and physiological processes. The current results are similar to chapters two, three and four and previous research that has found positive links between social/relational identification and social support (e.g., Avanzi et al., 2015; Branscombe et al., 1999; Bruner et al., 2020; Haslam et al., 2005; Levine et al., 2005). This then echoes the importance of the relationship between the provider and recipient in order for the exchange of social support to be deemed as effective (Haslam et al., 2012).

There was also evidence of these social factors being linked with the resource appraisals within the TCTSA. To illustrate, in study 1, provided emotional support was positively associated with self-efficacy change and provided instrumental support was positively associated with approach change. It was also found that received emotional support was positively associated with control change suggesting that the types of social support can influence resource appraisals in line with challenge and threat. These findings are in support of previous scholars (e.g., Slater et al., 2016) linking social support to the resource appraisals of challenge and threat and specific researchers who have found relationships between social support and self-efficacy (Rees & Freeman, 2009), and relational identification with the three resource appraisals (Slater et al., 2018). As such, and also similar to chapters three and four, these findings offer further evidence to indicate that the social factors could be considered additive and interactive with the

three interrelated resource appraisals proposed in the TCTSA. To put simply, having greater relational identification and social support is more likely to lead to greater perceptions of self-efficacy, control, and approach goal focus toward a stressful task.

Having a shared identification along with perceptions of social support was not enough to drive significant changes in CVR. This is in line and contributes to previous research which revealed social support to have no effect on CVR (e.g., Christian & Stoney, 2006; Craig & Deichert, 2002; Gallo et al., 2000). Social support involves complex interactions and dynamics which could underpin its effectiveness, especially in relation to CVR (i.e., social comparison, body language, emotional contagion, support visibility). Therefore, these factors need to be considered in future research as they may have explained why there were no changes in CVR in the current research. To illustrate, while some participants may perceive the support from the other person as helpful and a useful resource when preparing for the task, others may feel that they were being evaluated by the other person (i.e., social comparison) as such, increasing the demands (Bolger et al., 2000; O'Donovan & Hughes, 2008). It is suggested that 'support visibility' (i.e., direct vs indirect advice) is fundamental in determining the effectiveness of the support interactions (Zee & Bolger, 2019) and warrants further research. Nevertheless, utilising the challenge and threat framework as a basis for exploring CVR as used in this chapter, has moved beyond simple markers seen within past research and addresses the call for employing more complex markers (O'Donovan & Hughes, 2008). A prerequisite of a challenge and threat response is task engagement, which can be the extent in which the situation is relevant to the individual (Blascovich, 2008; Seery, 2013). In a recent review, Teoh and Hilmert (2018) also highlight that effort-related variables may be a moderator in the social support CVR relationship. In both studies, participants displayed increases of HR and perceived the task as important to

them which suggests task engagement in line with previous research on challenge and threat (e.g., Turner et al., 2014). Since data collection, the TCTSA has been revised (TCTSA-R; Meijen et al., 2020) which re-evaluates the resources, specifically to consider the inclusion of social support. It also offers suggestions for other physiological markers (e.g., oxytocin & neuropeptide Y) to indicate challenge and threat states, which warrants further investigation. Nevertheless, this chapter offers some further supporting evidence to position social support alongside the other three resource appraisals with the additional consideration of having an underpinning shared identification.

Another worthy consideration is the length of time in which social support could be offered, as in the current research participants were given five minutes together to prepare. It may be that more time is needed to elicit valuable social support benefits to influence self-report and CVR markers. Although, past research have found CVR changes with merely the presence of a supportive other (e.g., Kamarck et al., 1990; Phillips et al., 2006), without offering specific time for any support interaction on approach to an acute stress task. It could be that it is the perceived support that is more effective than received, which is consistent in the social support literature (Holt-Lunstad, Smith, & Layton, 2010; Smith, Birmingham, & Uchino, 2012; Uchino, 2004, 2009). The creditability and effectiveness of the support provider is also something to recognise. In both studies, participants were predominantly students who may be considered non-experts on the task. According to the Social Comparison Theory (Festinger, 1954), individuals have a need to evaluate and compare their own thoughts and opinions with others to reduce uncertainty in certain domains. For example, when it comes to stressful situations, individuals tend to draw on others for information on appropriate emotional responses, and for relevant information to best deal with the situation. As a result, the effectiveness of the support provision

within the dyads would differ on approach to the task, thus having an influence on CVR responses.

Previous researchers have been fairly inconsistent in establishing physiological differences between males and females towards acute stress (Kelly et al., 2007; Kirschbaum et al., 1992; Kudielka & Kirschbaum, 2005), although younger men have higher adrenocorticotrophic hormone (ACTH) and salivary cortisol compared to females (Kirschbaum et al., 1992). Results from the current studies reflect these equivocal findings as sex differences in CVR were found in study 2 but not in study 1. Researchers have also found no sex differences in challenge and threat (Blascovich et al., 1999; Moore et al., 2012). More consistent amongst the literature is that women tend to report more negative emotions such as depressive and anxiety related symptoms (e.g., Kelly et al., 2007; Thomsen et al., 2005) and this was also seen across both studies.

The current study was, to the author's knowledge, the first set of studies to connect both individuals in the dyads simultaneously to CVR recording devices following a task preparation (support) interaction period. This enables the research to capture a more complete picture of the CVR between the two individuals. By collecting objective measurements within the dyads, it is possible to explore how participant interaction can influence both individuals CVR, which extends that of previous research. This method of assessment helps shed light on the complex interplay between social factors and the human stress response, which presents fruitful avenues for further exploration. Another strength was the inclusion of both male and female participants which has been limited in past research, as these have predominantly used female samples (O'Donovan & Hughes, 2008). Study 2 also included observations of the dyad preparation interaction which was a novel method of assessing social support. This method can help

highlight support interactions that may not always be visible to the intended receiver but still have benefits such as reducing negative emotions (e.g., Howland & Simpson, 2010). Previous researchers have also used observer ratings to help identify support interactions (e.g., Priem & Solomon, 2015), which presents a valuable area for future study in order to capture a more holistic view of social support exchanges.

The current studies are not without limitations which offers future directions for research. First, across both studies there were self-report measures which are subject to reliability issues (e.g., social desirability). The present research did however include objective measures of CVR indices and observation data to try and overcome these drawbacks. The use of these measures along with additional objective markers proposed in the research (e.g., oxytocin, neuropeptide Y, heart rate variability) on challenge and threat (see Meijen et al., 2020; Uphill et al., 2019) should be considered. In addition, further research could look to explore more nonverbal methods of measuring challenge and threat states (e.g., Brimmell et al., 2018) and social support (e.g., Bodie et al., 2016). Second, the aim of the research was to explore more naturally and not to instruct participants on whether they should or should not offer support to the other individual. Future investigations could look to strengthen social support by using a confederate and directing them on how to provide that support similar to past research (e.g., Phillips et al., 2009). This would also allow for greater understanding of the types of support that are most beneficial to a given situation. In addition, it is not known whether the individuals within the dyads would offer or have offered support previously to each other in a more natural setting. For example, those in the friend condition may have had different past experiences of support interactions that may influence future provisions of social support to each other. Therefore, baseline measures of previous social support interactions within dyads would strengthen and be suggested for future

consideration. Third, social identification is not a fixed trait and can change based on the current context (Ketturat et al., 2016). It is possible that participants could have had variations in identification towards the other individual following the support which was not captured in these studies. Research could look to measure identification at different timepoints (i.e., before and after interaction) to examine such changes. Finally, while the studies adopted the speech element of the well validated TSST, the panel of judges were imagined rather than in the room with the participant. It may have resulted in the task being less stressful, although the results revealed heart rate and self-report anxiety scores to reflect an anxiety-provoking situation.

In summary, the present chapter addressed the third aim of the thesis by exploring the influence of social support, relational identification, and resource appraisals, on cardiovascular stress responses on approach to a speech task. These studies are among the first to examine relational identification and social support in line with challenge and threat. By adopting the framework set out in challenge and threat theory, findings revealed evidence that these social factors are related with resource appraisals in line with the TCTSA. While no significant differences or relationships were found between CVR and the conditions, sex differences emerged which has important implications for future research and applied applications.

## CHAPTER 6: GENERAL DISCUSSION

### 6.1 Summary of Findings

The purpose and contribution of this thesis was to investigate the role of social support and social identification in challenge and threat responses to stress. The specific aims were to: (i) cross-sectionally examine the role of social support and social identification in challenge and threat cognitive appraisals, perceived stress, and life satisfaction across a range of group contexts (chapters two and three); (ii) explore the influence of social support and relational identification on the resource appraisals as outlined in the Theory of Challenge and Threat States in Athletes (TCTSA; Jones et al., 2009) (chapters four and five); and (iii) investigate the influence of social support, relational identification, and resource appraisals, on cardiovascular reactivity (CVR) to acute stress (chapter five).

In chapter two, the effects of social support and social identification on individuals' challenge and threat cognitive appraisals, and the influence this has on perceived stress and life satisfaction were examined. The focus was within occupation contexts, namely public (service) sector and private sector workers. The results indicated that higher stress was best predicted by greater threat and lower identification with colleagues, and females also reported greater stress than males. In addition, greater social identification, social support, and lower threat, were related to greater life satisfaction. Participants reporting higher stress alongside lower social identification and life satisfaction, were more likely to report a greater intention to quit their job (turnover intention). The findings revealed no significant predictors of absenteeism, but job performance was positively related to greater identification with the organisation, greater life satisfaction, and lower perceived stress.

The aim of chapter three was to examine the associations between social support, social identification, challenge and threat appraisals, perceived stress, and life satisfaction across a range of group contexts (university students, workplace employees, team sport athletes, and group exercisers). Adopting a cross-sectional design, the findings indicated both social support and social identification were positively associated with the resource appraisals outlined in the TCTSA, extending the findings revealed in chapter two. Furthermore, the results provided evidence that the resource appraisals, social identification, and social support were associated with perceived stress and life satisfaction. Specifically, avoidance and challenge and threat were positively associated, while self-efficacy was negatively associated with perceived stress. Results also indicated that control, self-efficacy, social identification, and social support were positively associated, while approach, threat, and perceived stress were negatively associated with life satisfaction.

In chapter four, the aim was to examine changes in perceived resource appraisals and anxiety considering an individual's choice of social support for a stressful hypothetical task. By adopting a repeated measure hypothetical experimental design, measures of resource appraisals and anxiety were taken pre- and post-selection of participants' preferred choice of support (supported by friend, supported by stranger, or not being supported i.e., being alone). Results suggested that those who chose to be supported (friend or stranger) reported feeling more supported and that this would be more helpful (manipulation check) than those who chose to prepare alone (no support) for the stress task. Baseline resource appraisals and anxiety did not predict choice of support, but those who chose to be supported (friend or stranger) reported increases in self-efficacy and a reduction in avoidance goals compared to those who chose not to be supported. Results also indicated that avoidance change was positively associated with



changes in anxiety. This suggests that increases in avoidance goals are coupled with increases in perceptions of anxiety. In addition, helpfulness of support was positively associated with increases in control and decrease in avoidance goals. In other words, participants who perceived the support as helpful were more likely to report greater control and a reduction in avoidance goals.

The aim of chapter five was to examine the effects of social support and relational identification on resource appraisals and CVR on approach to an acute stress task in two laboratory experiments. The findings indicated that there was a strong positive relationship between relational identification and social support. There was also evidence in study 1 of the chapter to suggest these social factors have a relationship with resource appraisals in line with the TCTSA. No significant relationships were found between CVR and the two conditions (friend and stranger) in study 1. Similarly, there were also no significant differences between CVR and the three conditions (friend, stranger, and alone) in study 2. These findings suggest that CVR was not influenced by the relational identification conditions. However, sex differences emerged in the study, with females displaying CVR indicative of a challenge state and higher HR change (study 2), compared to males who displayed a more threatened response towards the stress task, and less HR change. Compared to males, females reported feeling more anxious across both studies 1 and 2, less confident and less in control following the preparation period in study 1. These sex differences were also reflected in the measure of performance, as males spoke for longer on the speech task indicating better performance, compared to females across both studies.

In summary, across all the studies there were positive associations between social (and relational) identification and social support. There was also evidence that these social factors are

associated with challenge and threat and resource appraisals of the TCTSA. Relational identification did not appear to be important to drive changes in CVR (chapter five). Sex differences did emerge with females reporting both self-report challenge (chapter three) and displaying CVR indicative of a challenge response and higher HR change, compared to males who displayed a more threatened response and less HR change towards the stress task (chapter five: study 1). Females also reported higher social support and perceived stress (chapter two), along with feeling more anxious (chapter five), less confident and less in control following the preparation period (chapter five; study 1) than males on approach towards the stress task. As a result, males demonstrated better performance by speaking for longer on the speech task compared to females (chapter five). Overall, the findings generated as part of this programme of research have valuable theoretical and applied implications, which are discussed in detail below.

## **6.2 Significance and Implications of Findings**

### **6.2.1 Theoretical Implications**

#### **6.2.1.1 The role of social support and social/relational identification in challenge and threat responses**

When presented with a motivated performance situation, there is a transaction between the individual and environment underpinned by an appraisal of one's personal ability to cope with the situational demands (Lazarus & Folkman, 1984). Two distinct states have been proposed within the BPSM and TCTSA which posit two such states, one adaptive (challenge) and one maladaptive (threat). Seldom in theory and research concerning challenge and threat has there been recognition of the influence of social factors (i.e., social support and social identification) on the occurrence of challenge and threat states. In the current thesis the role of social factors in the stress response have been demonstrated in three main ways in line with the

central aims. First, in relation to the first aim of this thesis, evidence to support the link between social support and social/relational identification is presented, along with how these social factors then influence challenge and threat cognitive appraisals, perceived stress, and life satisfaction. Second, findings from the research in relation to the second aim of this thesis indicate how these social factors could be considered additive or interactive to resource appraisals within the TCTSA. Third, in relation to the third aim of this thesis, evidence to establish to what extent these social factors influence CVR in line with challenge and threat were revealed. These areas will now be discussed in more detail.

**The link between social/relational identification and social support.** A growing body of research supports the notion that social identification is positively associated with social support (e.g., Bruner et al., 2020; Haslam et al., 2012; Haslam & Reicher, 2006; Levine et al., 2005; McKimmie et al., 2020). To illustrate, social identification has been found to be the basis of social support by allowing the support to be interpreted as intended by the provider (Ketturat et al., 2016). In this sense, social identification can be regarded as a key to unlock the greater potential benefits of social support. One such benefit is the effect that it can have on stress as outlined by the buffering hypothesis (Cohen & Wills, 1985). For example, social identification has been found to be a positive predictor of perceived social support and life satisfaction, while being a negative predictor of stress (Haslam et al., 2005). Chapters two and three in the present thesis provide supportive cross-sectional evidence for the positive relationship between social identification and social support across several group contexts (i.e., workplace employees, students, group exercisers, athletes). However, the strength of the relationship between social identification and social support in chapter two while significant, was relatively small, meaning they should be interpreted with caution. Within chapter three, a moderate relationship between

social identification and social support was found, which is similar to past research (e.g., Jimmieson et al., 2010).

To extend the findings that positively link social identification to social support, the current programme of research also focused on exploring these social factors at a more interpersonal level, specifically through the role of relational identification. Relational identification has received comparatively less research attention than social identification (Slater et al., 2018; Sluss & Ashforth, 2007). The interpersonal level focuses on one's role related relationships (i.e., supervisor-subordinate and co-worker-co-worker; Sluss & Ashforth, 2007), and the basic motivation is the dyad's welfare, and self-esteem derives from fulfilling one's role-relationship obligations. In this sense, the connection and intimacy among individuals (i.e., dyads) is likely to drive behaviour and influence health and stress related outcomes. For example, role relationships can offer social support to help alleviate the negative effects associated with stress (Haslam & Reicher, 2006). Chapters four and five found experimental evidence linking greater relational identification to greater social support. Through a novel hypothetical design, findings from chapter four revealed that those who chose to be supported by either a friend (high RI) or stranger (low RI) reported feeling more supported, and this support would be helpful for the stress task, compared to the those who chose to prepare alone. Relatedly, the findings from chapter five demonstrated that those in the friendship (high RI) condition provided (study 1) and received (studies 1 & 2) more support than those in the stranger (low RI) condition, on approach to the stress task. Collectively, this thesis provides evidence, across several research designs and populations, that social and relational identification is positively associated with social support. This positive association has some important ramifications on how social support may be utilised during stress. To elaborate, the social

context (i.e., who the support is from) and related perceptions of identification, can play a vital role in increasing the overall effectiveness of social support. Therefore, attaining high levels of connectedness (identification) should be considered an important facet when trying to harness the beneficial effects of social support. As such, any theoretical or applied utilization of social support should consider increasing identification between provider and recipient.

**The effect of social support and social/relational identification on challenge and threat.** The current thesis further contributes and extends the knowledge in this area by addressing the central aims through examining social support and social (and relational) identification in line with the challenge and threat framework, specifically the TCTSA. This was important in order to gain a better understanding of the human stress response, as past literature has seldom acknowledged the social aspects (Folkman & Moskowitz, 2004). The findings from the present thesis illustrate evidence of both social support and social/relational identification being positively associated with challenge appraisals and negatively associated with threat appraisals. To explain, chapters two and three provided cross-sectional evidence that social identification is positively related to challenge, and negatively related to threat. Similarly, chapter three revealed that social support was positively related to challenge and negatively related to threat. While chapter two found no evidence of social support being related to challenge, findings did reveal a positive association to threat. Caution should be applied when interpreting these relationships given their small to moderate relationships, although weaker coefficients are typical among larger samples (Armstrong, 2019). In addition, given the cross-sectional nature of the research, it is difficult to establish a causal relationship between the social factors and challenge and threat appraisals. In other words, it could be those who reported high threat appraisal were more likely to seek and report greater social support. However, these

findings do coincide with previous postulations from Slater et al. (2016) who suggested that social support could influence the perception of both resource and demand appraisals, and with past empirical evidence linking social support (Dixon et al., 2016) and relational identification (Slater et al., 2018) with challenge and threat. To further explore the link between these social factors and challenge and threat, the current thesis examined social support and social/relational identification in line with the resource appraisals put forth in the TCTSA. The resource appraisals are important components that determine challenge and threat therefore, to assess the second aim of the thesis chapters four and five implemented experimental methodology to gain a greater understanding and allow for the examination of causal relationships between social factors and the resource appraisals.

Findings from the current thesis demonstrated that these social factors can also be associated with the resource appraisals outlined in the TCTSA, namely self-efficacy, control, and achievement goals (approach vs avoidance). Chapter three established cross-sectional evidence for both social support and social identification being positively associated with self-efficacy, control, approach goals (but not avoidance goals). That is, those who perceive higher levels of identification to their group as well as higher levels of social support were more likely to report greater self-efficacy, control and have an approach goal focus indicative of an adaptive response to stress (Jones et al., 2009). Chapters four and five then indicated that being supported on approach to a stressful situation is associated with increased self-efficacy, control, approach goals and reductions in avoidance goals compared with receiving no support in the lead up to a stress task. Data from chapter four indicated that those who chose to be supported (friend or stranger) in the face of a stressful task experienced increases in self-efficacy and a reduction in avoidance when compared with those who chose not to be supported. Ratings of the helpfulness

of support was then associated with increases in control and decrease in avoidance goals. Similarly, in chapter five, when assigned to either a friend (high RI) or stranger (low RI) support condition, results from study 1 revealed that provided emotional support was associated with increases in self-efficacy, and provided instrumental support was associated with increases in approach goals, while received emotional support was associated with increases in control. Therefore, comparable effects were found when participants had the autonomous choice (chapter four) and when they were allocated their support conditions (chapter five). These current findings are in support of previous research in which links between social support and self-efficacy (Rees & Freeman, 2009b), control (Cohen, 1988; Schwarzer & Leppin, 1991) and personal goals (i.e., achievement goals) (Lee & Ybarra, 2017) have been reported. Findings from chapters four and five are also in line with research which found high levels of relational identification leading to greater self-efficacy (Miller et al., 2020), approach goals, and performance avoidance goals compare to those reporting low relational identification to a leader (Slater et al., 2018). In sum, the combined findings of the thesis address the second aim and indicate that perceptions of social support underpinned by perceptions of social/relational identification can influence resource appraisals in line with challenge and threat. In other words, if an individual perceives a high level of identification with a group or another individual, then they are more likely to experience increases in resource appraisals. These findings make important contributions to the literature, especially when considering social support as a resource appraisal as outlined in the revised challenge and threat theory (TCTSA-R; Meijen et al., 2020). To elaborate, findings from the thesis suggest that social support and social/relational identification are interactive with the resource appraisals of challenge and threat. As a result, encouraging the resource appraisals along with developing a sense of connectedness

(identification) and social support would help to promote a challenge state on approach to a motivated performance situation. However, the extent to which these social factors add over and above the other resource appraisals remains unknown and difficult to determine from the current findings. Therefore, independent manipulation of the resource appraisals and the social factors would be a warranted avenue for future research.

To extend the research and theory concerning social support, social identity and challenge and threat, the third aim of the thesis was to investigate the influence of social support, relational identification, and resource appraisals on CVR to acute stress. This is an important aim because some previous researchers have found that self-report measures are inconsistent with objective markers of challenge and threat (e.g., Turner et al., 2012), therefore chapter five presented research across two experimental studies and found that having a shared identification along with perceptions of social support did not influence CVR. This was the case when cardiovascular recording captured participants' CVR responses before the interaction with their partner (studies 1 and 2), and after the interaction period for the task preparation (study 1). While this can be corroborated by previous research demonstrating social support to have little effect on CVR (e.g., Christian & Stoney, 2006; Craig & Deichert, 2002; Gallo et al., 2000), there are a number of explanations for why there were no significant effects seen in CVR within chapter five. First, social support involves complex interactions and dynamics which could underpin its effectiveness (Cohen & Syme, 1985), especially in relation to CVR (i.e., social comparison, body language, emotional contagion, support visibility). For example, while some may perceive the support from the other person as helpful and a useful resource when preparing for the task, others may feel that they were being evaluated by the other person (i.e., social comparison) as such, increasing the demands (O'Donovan & Hughes, 2008). The 'visibility' of the support



interactions (i.e., direct vs indirect advice) could also be fundamental in determining the effectiveness of the support (Zee & Bolger, 2019) and on influencing CVR as seen in past research (Kirsch & Lehman, 2015). To illustrate, when support is explicit and direct (visible), this can sometimes increase the salience of stressors and reduce self-efficacy of the recipient by undermining their ability to cope and suggest they require the help from others (Bolger et al., 2000). Whereas, support which is subtle and indirect (invisible), can increase recipients' perceptions of their personal resources (i.e., self-efficacy) to cope with the situation (Zee & Bolger, 2019). In line with this, the credibility and effectiveness of the support provider is also a factor that could influence the effectiveness of the support. To elaborate, according to the social comparison theory (Festinger, 1954), when it comes to stressful situations, individuals tend to draw on others for information, and relevant information to best deal with the situation. In both studies, participants were students who may be considered non-experts on the task and as such, the effectiveness of the support provided may vary. Therefore, given the complexity of the interactions there may be variables outside those measured within the current research that would explain why no effects were found in CVR. For example, unconscious processing of social support makes it difficult to capture a true 'perception' of the support interaction, thus limiting the accuracy of the self-report data. Second, in the current research, participants were given five minutes in their dyads to prepare. It may be that more time is needed to elicit valuable 'provided' social support benefits to influence self-report and CVR markers. Although, past researchers have found that simply the presence of a supportive other is enough to see changes in CVR (e.g., Kamarck et al., 1990; Phillips et al., 2006), reinforcing the idea that perceived support is more beneficial against the harmful effects of stress than received support, which is consistent with the literature (Holt-Lunstad et al., 2010; Smith et al., 2012; Uchino, 2004, 2009). However, it is

perhaps too simplistic to distil the two CVR states (i.e., challenge and threat) from the dyad interaction within the current research. By exploring the more nuanced markers beyond the challenge and threat index, such as examining CO and TPR separately, could offer alternative insights and has been recently recommended for future research (Meijen et al., 2020). Third, the type of stress task that individuals were preparing for may have influenced how the support was perceived. The speech task was one that the participants performed on their own without their dyadic partner present. As such, while participants may acknowledge that they received support within the preparation period (as evidenced by the self-report data), this support may not be effective in influencing CVR as the support was mismatched for the context. For example, according to the Optimal Matching Theory (Cutrona & Russell, 1990), the benefits, or perhaps negative effects of social support are due to the matching of support in different contexts and situations. Therefore, it is unclear in the current research if the appropriate type of support was provided and perceived to achieve the desired effects and see changes in CVR on approach to the stress task. Examining the CVR responses to social support offers an objective way of exploring the effects of social interactions. That being said, supportive exchanges are complex with various dynamics and idiosyncratic variables involved. Further, the variations in methodology and measurement across the research raises concerns when trying to capture accurate findings. While the third aim of the thesis was to investigate the effect of social factors and resource appraisals on CVR responses, it is acknowledged that greater empirical research is needed in this area before drawing firm conclusions.

It is commonly acknowledged that challenge and threats states influence performance outcomes, with challenge leading to superior performance across a range of domains (see Behnke & Kaczmarek, 2018; Blascovich et al., 2011; Hase et al., 2018; Seery, 2011 for reviews).

For example, the performance outcomes have included problem solving (Chalabaev et al., 2009), mental arithmetic (Kelsey et al., 2000; Quigley et al., 2002; Tomaka et al., 1997; Tomaka et al., 1994), academic achievement (Seery et al., 2010), computer car racing game (Trotman et al., 2018), and sporting performance (Blascovich et al., 2004; Moore et al., 2013, 2015; Turner et al., 2013; Vine et al., 2013). However, the performance outcomes in some studies are not always treated as important as some of the psychological variables, therefore are not always hypothesised (e.g., Quigley et al., 2002; Seery et al., 2009; Tomaka et al., 1994). While performance outcomes were not a key area of focus across the research within the present thesis, there are implications, especially in line with the social factors. To illustrate, chapter two examined the role of social support and social identification in individuals' challenge and threat appraisals, and the effect this had on perceived stress and life satisfaction, intention to quit, absenteeism and job performance within an occupational context. Specifically, participants rated their overall job performance over the last month. Findings revealed that females with greater identification to the organisation and life satisfaction, along with lower perceived stress were related to greater job performance. Social identification has been linked with improved work motivation and greater performance outcomes (Guegan et al., 2017; Van Knippenberg, 2000), thus in support of current findings. A key facet of the social identity approach is that when individuals identify with a group, these group memberships become internalised as part of their sense of self (Tajfel & Turner, 1979). In other words, the groups successes and failures now become the individual's successes and failures. In addition, individuals with a high level of identification with a group will have a motivation to strive for and achieve group goals for the group's interest (James & Greenberg, 1989). To illustrate, Van Dick et al. (2009) across two studies manipulated group membership (by including a comparison group), and found that

participants in the high salient group conditions performed better than participants in the low salient group conditions in both brainstorming and simple motor tasks. It is acknowledged that findings from chapter two are cross-sectional, and so it could be that greater performance causes increases in social identification. In fact, social identity is not only considered a precursor to performance outcomes, but can also be viewed as a result of teamwork and group effectiveness (Hogg & Terry, 2000; McEwan & Beauchamp, 2014). Consequently, the internalization of a strong sense of shared social identity is considered a critical precursor and mechanism for understanding team dynamics and performance (Slater et al., 2020). Thus, social identity functions as an important aspect in performance across a number of different domains and contexts, which offers interesting avenues to explore within an applied context.

Performance in chapter five was determined by total talk time and time until first pause on the speech task. In that, a greater total talk time and time until first pause would indicate a more competent speaker and therefore better performance. Results of study 1 provided evidence to suggest that males with greater received emotional support and a decrease of received instrumental support along with reductions in HR were related to an increase in total talk time. Social support can be an important factor in the face of difficult and stressful situations and can manifest in various forms including emotional support (i.e., empathy and acceptance), instrumental/tangible support, (i.e., provision of material aid) or appraisal/informational support (i.e., provision of information that leads to alternative assessments of the stressor itself or one's ability to cope with it) (Cohen & McKay, 1984; Cutrona & Russell, 1990; House, 1981). As such, through engaging with and drawing upon others for support, this can help to temper the stress response and thus influence performance. The social support-performance relationship has been reported across various domains including sporting performance (e.g., Miller et al., 2020;

Moll et al., 2017; Rees et al., 1999; Rees & Hardy, 2004) and job performance (e.g., AbuAlRub, 2004). For example, receiving social support at the start of a competitive sporting season can predict performance satisfaction at the end of the season (Miller et al., 2020; study 2). Findings from chapter five (study 1) also suggest that emotional support rather than instrumental support was more beneficial to performance outcomes. As such, holding the perception that you had someone there for you, were being listened to, and that someone showed empathy for the situation, were beneficial for task performance. Similarly, past researchers have shown emotional support to be beneficial to flow (ideal state for peak performance) compared to information support (Rees & Hardy, 2004). This again highlights the complex nature of social support and the significance of matching the provision with the need of support in the face of stressful situations, in order to achieve desired performance outcomes (Cutrona & Russell, 1990; Rees & Hardy, 2004).

Notably, and in contrast to current research (e.g., Behnke & Kaczmarek, 2018), neither challenge nor threat appraisals predicted job performance (chapter two), and neither the resource appraisals nor CVR influenced speech task performance (chapter five). This could be explained in several ways. First, appraisals are fluid, iterative, and change based on new information (Blascovich & Mendes, 2000; Lazarus, 1999), thus the timing of the self-report and CVR measurement could yield differing results. For example, it is possible that what an individual once appraised as a challenge can be reappraised as a threat and vice versa. Data in chapters two and five were only collected at singular time points which may not be sensitive enough to capture the dynamic appraisal process. Second, it could be argued the measurement of performance (especially in chapter five) raises some concerns. To illustrate, total time talking may be considered an inaccurate measure of performance for a speech task, as it does not reflect

the true quality of the content spoken. Past researchers (e.g., Rith-Najarian et al. 2014) have utilized the Evaluated Speech Performance Measure (ESPM) which uses coders to evaluate the performance of the speech and offers greater insight into the speech quality (i.e., speech energy, body presentation, verbal communication), thus offering a more accurate measure of speech performance. Speech continuity is scored as part of the ESPM, which is calculated in a similar way to total talk time used in chapter five. However, total talk time (speech continuity) alone may not be a precise enough marker of performance to be influenced by challenge and threat cognitive appraisals as seen in the current research. Furthermore, self-report is subject to response bias (i.e., social desirability), so this raises some concerns regarding accuracy of self-rated performance (chapter two). In addition, appraisals are often being made without awareness (e.g., Blascovich & Mendes, 2000; Blascovich et al., 2004), for example, presenting issues capturing accurate appraisal processes through self-report methods. Third, not all researchers have found challenge to predict better performance, with some showing non-significant results or contradictory findings (studies 1 & 4: Feinberg & Aiello, 2010; Laborde, Lautenbach, & Allen, 2015). This indicates some caveats to the challenge and threat performance relationship echoing concerns outlined by Uphill et al. (2019). To illustrate, Turner et al. (2013) explored challenge and threat responses on approach to a pressured batting task in elite cricketers. They found there were several participants who displayed threat response but performed well on a batting task (they also reported high self-efficacy). In addition, there were several participants who displayed a challenge response but performed poorly (they also reported higher avoidance goals). As such, the psychological and physiological mechanisms in which challenge and threat can predict performance is complex. There may be additional individual and environmental factors accounting for greater variance in performance beyond the known determinants of challenge and

threat (i.e., resource appraisals of the TCTSA), and which also goes beyond what was measured in the current research.

In summary, across the findings there is evidence to suggest that social support and social/relational identification are positively related to and have an influential role in challenge and threat. This thesis extends past research by offering evidence that these social factors can also be associated and influence the resource appraisals outlined in the TCTSA, which are important components that determine challenge and threat (Jones et al., 2009). In addition, these findings do offer some additional supporting evidence for the postulations outlined in the recently revised TCTSA (TCTSA-R; Meijen et al., 2020), which acknowledges the importance of social support as a resource appraisal. As a result, these findings contribute to the scarce literature surrounding the role of social support and social (and relational) identification in the stress response, offering important insights and a greater understanding surrounding stress and coping. While there was no evidence of these social factors influencing CVR, some interesting findings emerged regarding the social factors and performance.

However, one finding that was common across the different studies of this thesis, were the sex differences in self-report and cardiovascular variables. Next, the following section will discuss this finding, which provides valuable theoretical and practical implications.

#### **6.2.1.2 Sex Differences**

Collectively, the findings from the thesis revealed sex differences across social support, challenge, and threat cognitive appraisals, CVR, and performance. Chapters two and three revealed that cross-sectionally females reported higher scores of perceived social support compared to males. Chapter three also found females reported higher self-report challenge appraisals compared to males. Within chapter five (study 1) females reported being less

confident and less in control following the preparation period than males on approach towards the stress task. Results from chapter five (study 2) revealed that females displayed CVR indicative of a challenge response and greater HR change, compared to males who displayed a more threatened response and less HR change towards the stress task. Females did however report feeling more anxious. This was then reflected in the measure of performance, as males spoke for longer on the speech task compared to females across both studies. It should be noted however, that the focus of the studies within the thesis is limited to biological sex and the notion of gender as a construct is beyond the scope of the thesis. Literature has offered some explanations for sex differences across social support, challenge and threat, and CVR responses, which will be outlined below.

**Sex differences in social support.** While findings from chapters two and three revealed that females reported higher scores of perceived social support compared to males, chapter five found no differences in either received and provided support (emotional, instrumental, informational) between males and females. These varying findings could be a result of the difference in study design or the measurement of social support. To illustrate, chapter five measured actual social support that participants received during the preparation time with their partners, whereas chapters two and three measured the perceptions of support to be available in response to stress. This could suggest that when it comes to actual support in the build-up before a stressful task, there are no sex differences in the amount of received and provided support. The literature does indicate it is the perceived support which is more beneficial than actual social support on a number of health outcomes (Cohen & Wills, 1985; Haber et al., 2007; Helgeson, 1993; Lindorff, 2000).



It is commonly suggested that females have larger social networks and are more emotionally involved in those networks accessing social support, especially in times of stress, compared to males (Belle, 1991; Cassidy, 2004; Turner, 1994). Wester et al. (2007) further states that a male's social support network may be limited due to seeking support or discussing emotions goes against male role expectations. As a result, this can have some profound effects on mental health such as risk of depression and detriments to overall well-being (Berkman et al., 1992; Panagioti et al., 2014; Teo et al., 2013). In this regard, findings from chapters two and three provide further evidence for the notion that females were more competent and confident to provide and interpret greater support when compared with males. This in part could be because females have more experience and larger social networks compared to males. In line with this, researchers have also found evidence that males tend to maintain intimate relationships with fewer people, while females identify a greater number of individuals who they consider as important and care about (Antonucci & Akiyama, 1987; Fuhrer et al., 1999).

There is also evidence to suggest that males and females differ in personality measures (Feingold, 1994). For example, females typically score higher in neuroticism than males, while males are found to score higher on assertiveness (Costa et al., 2001; McCrae, 2002). Consequently, as personality has been seen to be related to social support (e.g., Swickert, 2012; Swickert et al., 2010; Udayar et al., 2020), this may also explain why there are sex differences in chapters two and three. For example, past researchers have shown that perceived social support is associated with all the Big Five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, openness) (Swickert, 2012). For instance, it has been found that individuals high in extraversion and agreeableness, but low in neuroticism report higher levels of perceived social support (Swickert et al., 2004; Swickert et al., 2002). This can be explained by

the fact that individuals who are considered an extrovert are more likely to be outgoing, sociable, and friendly. Similar for those who are considered more agreeable, as they are more likely to be kind and gentle. On the other hand, those who are considered high on neuroticism (emotional instability) are more likely to be easily irritated and tense. Consequently, these traits play an important role in shaping one's social interactions and relationships, and would also be likely to have a significant influence on one's perceptions of social support (Swickert et al., 2010). In a different view, while personality traits may determine certain social interactions and social support (availability and perception), it could be that a supportive social environment may also predict personality traits by providing individuals an opportunity to foster key social skills and maintain social relationships (Udayar et al., 2020). In a longitudinal study, Udayar et al. found that extraversion, openness, agreeableness and conscientiousness were positively related, while neuroticism was negatively related to perceived social support. Further, individual's personality traits and perceived support changed little over a 4-year time and only a reciprocal predictive relationship was found between neuroticism and social support. In relation to sex differences, Swickert and Owens (2010) found that at low levels of neuroticism, females compared with males, reported higher overall social support and higher appraisal support. However, as neuroticism scores increased, there were no differences in general or appraisal social support between males and females. These results suggest that personality traits such as neuroticism and sex interact to predict social support. Taken together, these findings may go some way to explain why females reported higher scores of perceived social support compared to males in chapters two and three, and why no differences were seen in chapter five. While personality was controlled in the analyses in chapter five (study 2), greater examination of personality traits in the context of the research is needed to draw firmer conclusions.

There is a paradox though in the associations between sex, social support, and depression. While it appears that females often experience and report more social support than males, they also consistently report higher levels of depression (Turner, 1994). This could be in part, due to the greater social network that women have compared to males, which then possibly exposes them to more social evaluation (i.e., negatively judged by others). Others have suggested that the female hormone estrogen may help explain why females display heightened levels of neuroticism and negative affect (Walf & Frye, 2006). Although it is apparent that there are indeed sex differences in both the receipt and the perception of social support, the nuances of the exact processes remain unknown. This is in part due to the complexity of gender identity and the factors surrounding the biological, psychological, and social domains which cannot be ignored or overlooked.

**Sex differences in challenge and threat.** The findings across the thesis show mixed results regarding sex differences in challenge and threat. To illustrate, chapter two found no significant differences in sex for challenge and threat appraisal, whereas chapter three found females reported higher challenge scores than males. Across the chapters that measured the resource appraisals (chapters three, four & five), there were common findings in that there were no differences in sex found. Past research has been limited in examining sex differences in challenge and threat responses, with those that have also revealed no sex differences in challenge and threat (Blascovich et al., 1999; Kelsey et al., 2000; Moore et al., 2012; Tomaka et al., 1999).

A body of work has examined the effect of gender stereotype on challenge and threat states. For example, Vick et al. (2008) found that during a math test, women in the gender-biased condition (reminded of historical gender differences in math performance) displayed a cardiovascular response indicative of a threat, whereas the opposite was seen for males, as they

displayed a cardiovascular response indicative of a challenge when a gender-bias was implied, but threat when it was not. This bias is supposedly in favour of males, which is not to say males do not suffer from stereotype threat or stigma, rather just the context of the research. It was not expected that the speech task adopted in chapters four and five of the current thesis induced any gender stereotype threat that would influence CVR. While some have reported the type of stressor (i.e., interpersonal and achievement challenges) can induce sex differences (e.g., Stroud et al., 2002). A review by Ordaz and Luna (2012) found no evidence to suggest that there are sex differences in gender biased stressors, rather any differences were a result of the sex-specific differences in physiology, as opposed to cognitive perceptions about gender stereotypes.

Sex could be considered an important but complex dispositional factor due to varying innate differences (Zahn-Waxler & Robinson, 1995). The TCTSA does acknowledge that dispositional factors (e.g., optimism, hardiness & perfectionism) could influence challenge and threat states, but do not make specific predictions about how they, or others, do so. As such, this offers a valuable area for future researchers within the challenge and threat literature, and research should acknowledge and account for biological sex. Alongside the demand and resource appraisals and the physiological responses outlined within the TCTSA, postulations were made regarding emotional and performance consequences. In short, challenge should lead to more positive emotions, whereas threat more negative emotions. Challenge states also tends to lead to better performance (i.e., through improved decision making and cognitive function, decreased likelihood of reinvestment, greater self-regulation, and increased anaerobic power) compared to a threat state (Jones et al., 2009). Although, it is within these emotional consequences proposed specifically that research evidence has shed light on disparities regarding males and females.

More consistent amongst the literature is that females tend to report more negative emotions such as depression and anxiety symptomology (e.g., Kelly et al., 2008; Thomsen et al., 2005). This was seen in chapter five, with females reporting greater symptoms of anxiety towards the stress task than males. It is thought that females may be more vulnerable to the effects of stressors, which in part may be down to personal resources as females tend to be more pessimistic and lack self-esteem (Kling et al., 1999; Radloff & Rae, 1979). Although more broadly, sex differences in coping with interpersonal and emotional problems are inconsistent (Agam et al., 2015). Similarly, within chapter two, females reported higher perceived stress than males, although no differences were reported in overall life satisfaction. Though it is argued that there are even sex differences in the willingness to accurately report negative feelings (i.e., threat, anxiety) (Quigley et al., 2002). For example, women were more likely to report stressful responses under math performance than men (Hyde et al., 1990). The greater anxiety reported by females within chapter five though was then reflected in the measure of performance, as males spoke for longer on the speech task compared to females across both studies. Traditionally higher anxiety has been associated with poorer performance, but the TCTSA adopts Jones' (1995) model of debilitating and facilitative competitive state anxiety. In that, an individual can experience anxiety but perceive it to be helpful (facilitative) or unhelpful (debilitative) for performance. That being said, researchers (e.g., Hale & Whitehouse, 1998; Williams et al., 2010) have shown a positive association between anxiety and threat state.

In sum, there is limited evidence across challenge and threat literature regarding sex differences, and for those that have explored this area, have established mixed results, which is echoed within the current thesis. While sex differences in line with challenge cognitive

appraisals are largely unexplored, literature surrounding the physiological responses to acute stress provide a greater insight into potential variations among males and females.

**Sex differences in CVR and other related physiological markers.** Previous research findings have been fairly ambiguous in determining physiological differences between males and females towards acute stress (Kelly et al., 2008; Clemens Kirschbaum et al., 1992; Kudielka & Kirschbaum, 2005). Results from chapter five reflect these ambivalent findings as sex differences in CVR were found in study 2 (females displayed responses indicative of a challenge state and higher HR change than males) but not in study 1. Typically, in laboratory experiments, tasks involving social evaluative threat (i.e., negatively judged by others) have been the strongest psychological stressors to evoke a stress response (Dickerson & Kemeny, 2004). One commonly used paradigm is the TSST (Kirschbaum et al., 1993) which involves a public speaking and mental arithmetic task. Sex differences in heart rate and Hypothalamic-Pituitary-adrenal axis (HPA) responses on the TSST and similar speech tasks have been inconsistent. While some studies suggest no sex differences in heart rate responses (Kelly et al., 2008), others have found females to respond with a larger HR increase than males (Childs et al., 2010; Kudielka et al., 2004). This is similar to findings of chapter five (study 2), which adopted the speech element of the TSST. Within the BPSM and TCTSA, challenge and threat are marked by distinct patterns of CVR and can be measured using cardiovascular recording equipment in the laboratory (as seen in chapter five). In a challenge state, an increase in sympathetic adrenal medullary (SAM) activation accompanied by catecholamine (epinephrine & norepinephrine) is met with increased HR, cardiac output (CO), and decreased total peripheral resistance (TPR). On the other hand, in a threat state SAM activity is also increased, however it is accompanied by increases in HPA activity and the release of cortisol resulting in the increasing or stabilising TPR and CO

(Dienstbier, 1992; Dienstbier, 1989; Harvey et al., 2010). As a result, a challenge response is representative of an efficient response to a stressor in which increased blood flow to the brain and muscles, higher blood glucose levels, and an increase in free fatty acids, can be used by muscles as fuel compared to a threat response (Dienstbier, 1989, 1992). The activation of the HPA axis under stress causes the secretion of adrenocorticotrophic hormone (ACTH) subsequently causing the release of cortisol and there is evidence to suggest that biological sex could be a moderating factor (e.g., Kudielka & Kirschbaum, 2005). It is important to note that rather than examining cardiovascular indices (i.e., HR, blood pressure) as independent variables, CVR refers to the difference in an individual's cardiovascular function between periods of rest and during the presentation of an external stressor (Cinciripini, 1986). Therefore, any circulatory differences between sex (e.g., catecholamines and cortisol) that may influence reactivity is of interest, as displaying exaggerated CVR in response to stress has been hypothesized to lead to higher risk of cardiovascular disease (Krantz & Manuck, 1984).

Past reviews have found that males tend to have greater ACTH and higher cortisol increases than females in response to a stressor (Kajantie & Phillips, 2006; Kudielka & Kirschbaum, 2005; Liu et al., 2017). It has been argued however that any differences in the stress response between males and females might be caused by hormones and developmental changes rather than any cognitive differences in biological sex (Ordaz & Luna, 2012). For example, the cyclical variation of the menstrual cycle causes changes in the neuroendocrine responses (Taylor et al., 2000). Past researchers have also revealed the effects of estrogen-containing oral contraceptives on the endocrine responses to stress. For example, while displaying similar heart rate and self-report stress ratings to those not on oral contraception, those taking oral contraception demonstrated blunted or even absent free cortisol responses to the TSST

(Kirschbaum et al., 1995). Furthermore, Kajantie and Phillips (2006) have suggested that pregnancy is associated with attenuated physiological reactivity due to the increases of estrogen that have stemmed from evolutionary pressures to protect the fetus from the negative effects of maternal stress responses and elevated cortisol. Another important physiological hormone associated with cortisol release is oxytocin, and it can play a role in moderating the stress response. The neuropeptide oxytocin is released during supportive social contact and can reduce the body's stress response (Taylor, 2006). It is thought that the traditional fight-or-flight response may help promote survival among males (i.e., supporting aggressive behaviour or escape), but Taylor et al. suggest females adopt a "tend and befriend" response which is more conducive for protecting and nurturing offspring from threat and is associated with a greater release of oxytocin. As a result, there is a pronounced difference in terms of how males and females behave and respond to stress. Oxytocin has been associated with reductions in cortisol under acute stress (Cardoso et al., 2013, 2014; Ditzen et al., 2009; Heinrichs et al., 2003; Linnen et al., 2012). Further, when oxytocin is combined with social support, this has been shown to elicit low cortisol concentrations as well as increased calmness and anxiety during stress in males (Heinrichs et al., 2003). Taken together, these physiological markers can go some way in providing an explanation for the sex differences found in the current thesis. It is important to acknowledge some of the moderating factors that could influence the physiological responses to stress as this can advance theory and better understand human responses to stress. More recently, the TCTSA-R (Meijen et al., 2020) has recognised oxytocin as a key indicator on approach to motivated performance situation and suggested that this could be reflected in challenge and threat states. Although, the exact mechanisms are unknown and warrants further research.



In short, this thesis has provided evidence to show some notable sex differences across social support, challenge, and threat, CVR, and performance outcomes. Cross-sectional data suggested that females reported greater perceived social support and higher self-report challenge appraisals than males. Experimental evidence then suggested that females exhibited CVR indicative of a challenge response and greater HR change, compared to males who exhibited a more threatened response and less HR change towards the stress task. There was also evidence that females reported greater anxiety and being less confident and in control following the preparation period with a partner. Sex differences in performance were reflected in the speech task, as males spoke for longer indicating better performance, compared to females. These variable patterns among males and females have been explained through past theory and research and offer some valuable contribution to knowledge. While the focus was on biological sex rather than the construct of gender per se, it is acknowledged that there are socially derived differences in gender (i.e., gender roles, masculine stereotypes) that may establish further influential effects. It is hoped that future researchers see the examination of sex differences as a warranted area for further work and unpick some of the complex nuances.

### **6.2.2 Applied Implications**

The findings from this thesis have several applied implications. First, chapters four and five indicate that through varying levels of relational identification, this can influence how much social support is perceived. To put simply, those who prepared with someone they felt they had a high connectedness to (high relational identification), reported greater perceptions of social support than those who prepared with someone they felt lower connectedness to (low relational identification) on approach to an acute stress task. This is important for sports coaches, managers, and senior leaders to consider developing relational identification in order to increase

perceptions of social support. Further, these findings are key in helping to understand how best to utilise social support as a resource appraisal, as growing literature posits that social support is beneficial in reducing the deleterious effects of stress (e.g., Cohen & McKay, 1984; Lakey & Cohen, 2000). The effects of social support have predominantly been based around the two main concepts, the main effects model and the stress buffering model (Cohen & Wills, 1985).

Although, these notions have not considered the social context in which the social support is provided (McKimmie et al., 2020). As such, emerging literature has investigated the role of social identification in increasing the effectiveness of social support (Haslam, Jetten, Postmes, et al., 2009). In the current thesis, there is evidence to suggest the various benefits that social support underpinned by social/relational identification can have on the stress response. Notably, psychosocial factors such as social support and social/relational identification can influence the appraisal process through the perception of challenge and threat (chapters two and three) and the resource appraisals within the TCTSA (chapters three, four, and five). Accordingly, these findings could help inform practitioners and researchers to become more aware of the social factors that could help individuals deal with the stress within motivated performance situations. To elaborate, fostering a greater sense of identification within a group is not only likely to increase the perceptions of social support but also improve the effectiveness of that support.

Second, the findings from chapter four demonstrated that if an individual can imagine the support available to them when preparing for a hypothetical speech task, then this can have some positive associations to the resource appraisals outlined in the TCTSA. As a result, this could be applied in the manipulation of the resource appraisals, while including social support. Past research have used instructional sets (e.g., Feinberg & Aiello, 2010; Turner et al., 2014) and imagery (e.g., Williams & Cumming, 2012; Williams et al., 2010, 2017) to elicit both challenge

and threat states. Therefore, with the inclusion of instructions (verbal or imagined) encouraging individuals to reflect on their social support network and the welcomed benefits, this could elicit more adaptive responses and positive performance outcomes. An additional benefit to imagined support is that individuals are more likely to create the idealised outcome, as the mind is not bound to reality (Byrne, 2007). This could have clear ramifications for those individuals who could benefit from greater perceptions of social support. For example, an athlete about to perform could imagine receiving helpful support from their coach around information to better deal with the situation (i.e., informational support). In another illustration, an individual preparing for an interview could imagine someone (they feel a strong connection to) showing genuine encouragement, reassurance, and compassion (i.e., emotional support). Consequently, social support when underpinned by high levels of identification could be considered additive and interactive with the other resource appraisals through increasing self-efficacy, perceptions of control, and encouraging more of an approach goal focus (Cohen, 1988; Lee & Ybarra, 2017; Rees & Freeman, 2009a; Slater et al., 2018; chapter five, study 1). While this may make sense in theory, it is acknowledged that empirical research is required to explore this further.

Third, chapters two and five (study 1) provided evidence to suggest that social/relational identification and social support are not only limited to having health and well-being benefits but can also be associated with performance outcomes. Chapter two revealed evidence that greater identification with the organisation and life satisfaction, along with lower perceived stress were related to greater job performance. Chapter five (study 1) then revealed evidence to suggest that greater received emotional support and a decrease of received instrumental support and HR were associated to an increase in total talk time on the speech task. Accordingly, both social identification and social support were associated with greater performance outcomes which has

implications for those trying to improve performance (i.e., sports coaches, managers, senior leaders). To elaborate, by encouraging connectedness (social identification) within a group, an individual can be driven to enhance performance not just for themselves, but for the group as a collective (Bjerregaard et al., 2015). Past research in sport for example has suggested that having high levels of identification with a team can reflect in increases in commitment and effort (e.g., Martin et al., 2018) as well as team confidence (Fransen et al., 2014). More so, an increase in identification is positively associated with increases in social support (e.g., Bruner et al., 2020; Haslam & Reicher, 2006; McKimmie et al., 2020; chapters two, three, four, & five). Therefore, not only acting as a buffer against the deleterious effects of stress (Cohen & McKay, 1984), but support from others can also be useful in directly improving performance outcomes (e.g., providing information to help complete a task successfully).

Fourth, the current thesis provides evidence of sex differences across social support, challenge, and threat cognitive appraisals, CVR, and performance, which highlights some important considerations when understanding how males and females respond to stress. In chapters two and three, cross-sectional evidence indicated that females reported higher scores of perceived social support compared to males. In an applied context, this can be considered useful as it may suggest that females are more able to access their social support networks in times of stress than males (Belle, 1991). Therefore, given the positive effects of social support on stress (e.g., Cohen & McKay, 1984; Lakey & Cohen, 2000), practitioners may choose to adopt approaches which aim at encouraging males (and of course females) to draw upon their supportive networks (i.e., reflective tasks, creating support groups etc). More so, an emphasis should be placed on developing a connection (identification) to others so that support is perceived as intended (Ketturat et al., 2016). Practitioners that are consulting with clients may

also wish to apply results from chapters four and five to understand that not all stress is equally as stressful to everyone. To explain, stress is considered an interaction between the individual and environment underpinned by an appraisal of one's personal ability to cope with the situational demands (Lazarus & Folkman, 1984). The initial (primary) appraisal involves the evaluation of motivational relevance and congruence. Motivational relevance relates to how important the individual perceives the situation to be to their well-being, whereas motivational congruence refers to the individual determining how consistent or inconsistent the situation is with their goals (Smith & Kirby, 2009). The results from the current thesis indicate that there are sex differences in how stress is perceived which raises an awareness and greater understanding for those trying to reduce the adverse effects of stress (i.e., managers, sports coaches, senior leaders). To illustrate, the findings from chapter three indicated that females reported higher self-report challenge appraisals compared to males in relation to stress experienced within the past month. In addition, experimental evidence from chapter five (study 2) suggested that females displayed CVR indicative of a challenge response and greater HR change, compared to males who displayed a more threatened response and less HR change towards the speech task. This indicates that females displayed more adaptive responses to both self-report and physiological responses to stress. Although, females did report feeling more anxious compared to males. Further, the findings from chapter five (study 1) indicated that females reported being less confident and less in control following the preparation period than males on approach towards the stress task. Thus, intervention strategies designed around managing anxiety symptoms whilst improving confidence and control in females, may be beneficial based on the current findings.

Finally, there are sex differences in performance on the speech task seen within chapter five which have important applied ramifications, especially when relating the task to similar

types of oral assessments (i.e., academic presentation, job interviews, delivering a business pitch). To illustrate, findings from both studies in chapter five revealed that males spoke for longer on the speech task compared to females indicating better performance. Hence, a speech task may not have captured the entire skill set or abilities of the female participants and allowed for a full showcase of their personal strengths. Some real-world examples include an interview to select staff, or an oral presentation as part of an academic assessment. Therefore, in an applied sense, it is worth considering other forms of evaluations (e.g., small group tasks, creative exercises, practical demonstrations, etc) rather than relying on an oral assessment to make informed decisions or outcomes. Taken together, the results of the current thesis have demonstrated some unique sex differences in how males and females respond to stress. Accordingly, it is important for managers, sports coaches, senior leaders, and practitioners for example, to consider the role of sex when trying to understand ways in which they can encourage helpful and adaptive responses to stress.

Collectively, the current thesis offers several applied implications that could help promote better health and well-being as well as performance related outcomes. These can be particularly pertinent during motivated performance situations (i.e., periods of high demand) such as interviews, academic assessments, sporting competition, as well as difficult transitions (moving jobs, starting a new school/university).

### **6.3 Strengths and Limitations**

This thesis adds to the understanding of the stress and coping literature in several ways. First, the current programme of research is among the first to examine social support alongside social/relational identification and challenge and threat, especially with a focus on the resource appraisals within the TCTSA. This is important as challenge and threat theories have chiefly

focused on individual differences and personal factors (e.g., personality, perceptions of control, self-efficacy, and self-esteem) on approach to a motivated performance situation, and not social components. As a result, there is currently no tested theoretical approach which acknowledges the potential effect that social support and social identification can have and the possible role it can play in the challenge and threat response. Moreover, very few studies have examined the connection between social support and social identity and made direct links to challenge and threat states (see Dixon et al., 2016; Dixon & Turner, 2018; Miller et al., 2020; Slater et al., 2018 for exceptions). While the TCTSA has been revised (TCTSA-R) to acknowledge social support as a resource appraisal, there is little empirical evidence to support this notion. In fact, to date only one (see Miller et al., 2020) study has been published which has operationalised social support as a resource appraisal. In two studies with an athletic sample, Miller and colleagues found that relational identification and group identification mediated the positive relationship between identity leadership and self-efficacy, control, approach goals and social support. In addition, perceived social support at the beginning of the competitive season predicted increased performance satisfaction at the end of the season. Although, this study was in the context of leadership identity, so applicability to other domains is limited. In addition, the study relied on self-report measures, thus objective physiological markers outlined in challenge and threat were not determined. As such, the current thesis offers further empirical evidence across five studies which suggests when underpinned by identification, the perception of social support can be a valuable resource appraisal in the response to stress.

Chapters two and three provide evidence across different group contexts to demonstrate the positive role that social support and social identification can have on perceived stress and related outcomes (i.e., life satisfaction, intentions to quit, & job performance). Not only does this

add to and support the current literature (e.g., Cruwys et al., 2014; Haslam et al., 2018; Haslam et al., 2004), but these findings also have important ramifications in how stress can be managed. In Great Britain alone, 12.8 million working days were lost due to work-related stress, depression or anxiety, and accounted for 44% of all work-related ill health cases in 2018/19 (Health and Safety Executive, 2019). With the economic costs to the British society as a result being estimated to be around £5.2 billion every year (Health and Safety Executive, 2016). Therefore, these findings can help and further contribute to emphasizing the valuable role of the psychosocial factors in the management of stress. There was also some evidence (chapter two) to draw a connection of these social factors to challenge and threat appraisals as well as the resources outlined within the TCTSA which has been scarce in the literature. Similar outcomes were seen in relation to a specific (state) stressful event (chapter two) and an individual's general (trait) response to stressful situations (chapter three). These findings could then be extended within a more experimental methodology within chapter four, as the results showed that being supported on approach to a hypothetical stressful task and the subsequent ratings of helpfulness of that support were associated with positive resource appraisals (increase self-efficacy, control, and decreases in avoidance goals). This is important to better understand the mechanisms and contributions of the social factors in contemporary stress and coping theory.

The research in chapter five adopted complex experimental designs encompassing physiological markers of challenge and threat. This allowed for the examination of objective measurements of stress whilst establishing the role of the key social factors. Although the use of dyadic paradigm have been used to explore social support in the past, most research have examined the effects of romantic partners (e.g., Thorsteinsson & James, 1999). By looking at strangers who are newly acquainted, it presents a deeper insight into social support on the stress



response, beyond the assessment of those who have a pre-existing relationship (i.e., romantic partners, family members, friends). Further, the majority of experimental research examining social support (e.g., Christenfeld et al., 1997; Phillips et al., 2009) has randomly assigned participants to conditions rather, in this research, the aim was to explore the effects more naturally and not to instruct or manipulate participants in a way that would suggest whether they should or should not offer support to the other individual in the dyad. By adopting this design, it closely reflects the more natural setting in which support interactions take place (i.e., prior to a presentation or interview). Accordingly, this thesis makes a novel contribution to the literature by exploring the naturally occurring effect of relational identification and social support on CVR. Further, the studies in this chapter test social support and relational identification on physiological markers of challenge and threat. This is a notable strength to advance understanding in stress and coping and to assess recent theoretical conceptions (i.e., TCTSA-R) considering social support as a resource appraisal.

Despite the strengths and novel findings, the research within this thesis is not without its limitations. First, the experimental nature of chapters four and five were limited to a laboratory-based task and although providing internal validity through the RI conditions, they lacked ecological validity. Given the intricate set-up for measuring cardiovascular markers in research, this can make it difficult to test in an applied setting. However, research in challenge and threat has used more real-world motivated performance situations (e.g., McGrath et al., 2011; Moore et al., 2014; Turner et al., 2013; Vine et al., 2013; Zanstra et al., 2010). For example, Zanstra et al. (2010) examined CVR using an ambulatory recording device before, during, and after performance of a presentation as part of participants course requirements. The TSST, especially the speech element could be applied to more real-life settings. To illustrate, the standard

procedure of the speech element involves participants to imagine they have applied for a job of their choice and present to the panel on why they believe they are the best person for that job (Kirschbaum et al., 1993). There are several comparable real-world examples which induce social evaluative threat and unpredictability (i.e., an interview, viva voce exam, delivering a business pitch, academic presentation, public speaking). The effects of real-world stressors appear to elicit larger stress responses and may provide a better insight into the stress related process that cause disease rather than those in laboratory settings (Zanstra & Johnston, 2011). Therefore, researchers should look to offer more ecological valid contexts without the expense of losing internal control.

Secondly, some issues arise with the measurement of key variables. To illustrate, given the complex nature of social support (Schwarzer & Knoll, 2007), this inherently raises some issues with measuring the construct. Self-report measures are susceptible to bias, although have been widely accepted as the tool to measure both perceived and received social support. For instance, the multidimensional aspects (i.e., the sources of support) of the measures used within this thesis attempted to capture the intricate nature of support and has been shown to have greater associations with psychological outcomes (i.e., life satisfaction) than non-multidimensional measures (Cohen & Wills, 1985). Chapter five (study 2) offers up a novel approach by adopting social support behavioural analysis which involved reviewers rating the interaction within the dyads. Nevertheless, a limitation to this method is that the nonverbal social support was overlooked. Nonverbal cues (i.e., eye contact, head nods, body lean) have some beneficial effects on a range of support outcomes including health and well-being (MacGeorge et al., 2011). Thus, future researchers could look at trying to capture the nonverbal cues of social support given its importance. For example, nonverbal behavioural coding has been used in past research to capture

nonverbal cues (e.g., Bodie et al., 2016) and could even expand across to challenge and threat research (see Brimmell et al., 2018) which offers a useful avenue for future research. Challenge and threat can be assessed through both self-report and physiological indices, yet the two do not always marry up (e.g., Turner et al., 2012). The discrepancy between CVR and self-reported measures of challenge states may support the notion that indirect measures may be a more effective way of assessing these states, due to potential unconscious mechanisms (Blascovich & Mendes, 2000; Blascovich et al., 2004). Only chapter five adopted physiological markers of challenge and threat alongside self-report measures. Therefore, greater use of self-report alongside CVR markers of challenge and threat would benefit the research surrounding social factors and challenge and threat. More recently, researchers have suggested that challenge and threat states are two dichotomous states rather than considered on a unidimensional continuum (Meijen et al., 2020; Uphill et al., 2019). In this regard, an individual for example, can be both challenged and threatened on approach to a motivated performance situation, which offers avenues for alternative challenge and threat measurements. It is worth mentioning that chapters four and five were carried out using a young population of university students. Research on social support has typically examined CVR in younger populations (e.g., Gramer & Reitbauer, 2010), therefore considering age-related differences in stress related responses across a heterogenous sample is a useful direction for exploration.

Third, the thesis lacked longitudinal measurement within the research studies and so the interaction and longevity of the effects could not be determined. To illustrate, chapters two and three were cross-sectional and therefore without temporal precedence. As a result, the direction of the relationships could not be determined to establish causal order from the current analysis. The relationship between social support and social identification in the stress and coping process

for example is not well established (McKimmie et al., 2020), calling for research designs to adopt multiple data collection points to explore possible meditational models to ascertain casual effect. Literature also suggests that appraisals are iterative (Blascovich & Mendes, 2000) and as such, the psychological states captured in the self-report and CVR recording may not reflect the dynamic appraisal process. Specifically, both self-report and CVR measures in chapter five were taken both before and after task instructions, but not during the task performance. Appraisal of demands and resources are subject to change based on new information, so it may be that what an individual once appraised as a challenge can be reappraised as a threat and vice versa. This could offer an explanation as to why challenge and threat did not predict performance in chapters two and five as data was only collected at singular time points. While the data in chapter five sought to reflect both self-report and CVR measures close to performance, this may not capture the entire appraisal process on the approach towards a motivated performance situation. Researchers have examined the role of reappraisal and supported the notion that appraisals can change based on changing cognitive information (e.g., Jamieson et al., 2010b, 2012, 2018; Moore et al., 2015; Sammy et al., 2017). More recently, researchers have reported the effects of reappraisal and emotional contagion to others on challenge and threat (Oveis et al., 2020). To illustrate, Oveis et al. found that by interacting with a person engaging in stress reappraisal, the nonmanipulated teammate exhibited more adaptive cardiovascular responses indicative of challenge. As such, capturing recordings of CVR throughout the support interaction and the motivated performance situation may offer a greater insight into the role of the appraisal process and subsequent outcomes (i.e., emotional states and performance).

## 6.4 Future Research Directions

The current thesis provides an original contribution to knowledge by examining the role that social support and social and relational identification can have in challenge and threat responses to stress. Evidence was found to suggest that social support underpinned by identification to a group/individual can be additive and interactive with the resource appraisals outlined in the TCTSA (chapters three, four, and five) and be associated with challenge and threat responses (across all empirical chapters). As a result, the findings suggest several avenues for future researchers. First, the most significant area for further research is to recognize and establish how exactly social support and social (and relational) identification may be considered as a resource appraisal to fit alongside current challenge and threat frameworks. The operationalisation of social support is crucial, but given the complexity can present some issues as well as what can be considered a paradoxical effect (Maisel & Gable, 2009). On one hand, evidence suggests that social support can be useful particularly in the face of stressors (e.g., Cohen & McKay, 1984; Uchino, 2004, 2006; Uchino et al., 2012; chapter three). On the other hand, researchers have suggested social support could have negative effects (e.g., Bolger et al., 2000; Deelstra et al., 2003; Gleason et al., 2003). For support to be effective, Gleason and Iida (2015) proposed that the provider of the support must consider: (a) the when (timing and temporal process of support); (b) the who (characteristics of receivers and providers of support); (c) the what (types of support); and (d) the how (ways in which the effectiveness can be maximized). Through the social identity approach, it is possible to understand some of these and how and why group memberships can influence the effectiveness of social support on stress and well-being. By sharing a group membership and through the process of identification, individuals feel a sense of connectedness and belonging thus influencing the primary and secondary

appraisals (Haslam & Van Dick, 2011). Therefore, by understanding the context in which the support takes place provides a useful platform and basis for social support transactions and perceptions to occur. In line with this, a worthy consideration then is the conceptualisation of social support and social identification in the stress and coping process. To explain, scholars have proposed that social support mediates the relationship between social identification and coping (Haslam et al., 2005), while others suggest the opposite, in that social identification mediates the relationships between social support and coping (Cassidy, 2004). More recently, it was proposed that social support and social identification were two simultaneous perceptions as a result of group membership (McKimmie et al., 2020). Thus, considering both social factors are deemed important in the stress response and on welcomed outcomes (i.e., life satisfaction, well-being), so it would seem useful that they should both feature within the challenge and threat framework. The findings from the current thesis offer empirical evidence to suggest that when underpinned by high levels of identification, the perception of social support can be a valuable resource appraisal in the challenge and threat response to stress. Therefore, the further utilization of social support and social identification in challenge and threat is warranted and suggested for future research.

Conceivably, and still unclear from the literature and the current thesis, is the timing of support on approach to an acute stressor and this was apparent in chapters four and five. To elaborate, participants were given five minutes to either imagine (chapter four) or interact (chapter five) within their dyad to prepare for the speech task. It is not known whether this time was sufficient to elicit the effects from the support interactions and given that no significant changes were seen within CVR (chapter five), it could be argued to be the case. It may be that more time is needed to obtain significant social support effects to influence self-report and CVR

markers. In line with this, researchers have suggested that ‘invisible support’ (i.e., subtle and indirect support) may be more beneficial during the earlier stages of a demanding situation (Bolger & Amarel, 2007). However, ‘visible support’ (i.e., explicit and direct support) may be more beneficial once the recipient has appraised the situation as demanding and acknowledges that help is needed (Zee & Bolger, 2019). As such, future studies could investigate the exact timing of when, how long, and the manner (visible vs invisible) of the support provision that takes place on approach to a stressful situation to incite the intended benefits. This would have valuable applied benefits and on interventions aimed at improving both perceived and actual (received) social support. Applied interventions have included upgrading the helping skills of individuals, creating support groups, setting up mentoring and coaching programs (Cohen et al., 2000). Further interventions could look at the perceptions of social support and whether the supporter is needed to be present for the benefits to take place. The findings from chapter four suggest that if an individual can imagine the support available to them, then this can have some positive associations to the resource appraisals outlined in the TCTSA when preparing for a hypothetical speech task. Given it is the perception of support (rather than the receipt) that is consistently related with positive health outcomes (e.g., Cohen & Wills, 1985; Haber et al., 2007; Helgeson, 1993; Lindorff, 2000), this offers an area for further examination.

Second, the longitudinal effects of the social factors on the challenge and threat and stress were not measured in the current thesis. As such, it could be that those with a supportive network are more likely to engage in more stressful situations for example. While some attempt was made to establish cause and effect in the experimental methods of chapters four and five, additional longer-term measurements would be needed to examine these relationships and any possible interaction effects. Moreover, social identification is not a fixed entity and strength of

relationships can change based on current context (Ketturat et al., 2016). It may be possible that over time the level of identification within a group changes (i.e., increase or decrease) which would then influence other important factors related to stress (i.e., social support). Future researchers could look to measure social identification across time to examine such changes. In addition, it is important to note that other than chapter two, the thesis was mainly focused on acute stress responses. However, the findings from chapter two suggest that when participants reflected on their most stressful event over the last three months, social identification and social support were associated to positive outcomes in an occupational setting (i.e., reduced stress, less intentions to quit, greater performance and life satisfaction). Thus, longitudinal studies would be useful in assessing these effects across greater time periods to establish causal direction as well as exploring the impact on more chronic stress.

Third, measuring stress objectively through CVR has strengths over more self-report assessments (i.e., not subject to social desirability), although CVR is just one example of many other physiological measures that could be used to better understand the mechanisms of the stress response. For example, the endocrine and immune systems have been used to measure the responses to stress. To illustrate, the HPA activity has been associated with a threat response and accompanied by increases in cortisol (Jones et al., 2009). While cortisol in the short term is important for everyday functioning and maintenance of homeostasis, long term effects of increased cortisol can do serious damage to our bodies (i.e., blood sugar imbalances, weight gain, CVD, immune system suppression; Lovallo, 2005). Although this thesis only assessed anticipatory responses to acute stress and neuroendocrine responses were not directly measured, therefore presenting a useful future research direction. Currently, only one study (see Poppelaars et al., 2019) has measured neuroendocrine responses in line with challenge and threat, perhaps



due to the complex method of measurement of hormones such as cortisol (Dickerson & Kemeny, 2004). Another important physiological hormone associated with cortisol release and the stress response is oxytocin. The TCTSA-R (Meijen et al., 2020) outlines oxytocin as a key indicator on approach to motivated performance situation and suggested that this could be reflected in challenge and threat states. Although to date, very few studies have explored oxytocin in line with challenge and threat framework. In one study, Kubzansky et al. (2012) found that participants given oxytocin compared to a placebo exhibited a trend towards a challenge response with greater increases in CO and ventricle contractility (indicating greater sympathetic activation) in response to social stress (TSST). Therefore, this presents a useful area for further research, especially given oxytocin's close links to social support (Heinrichs et al., 2003; McQuaid et al., 2016).

A further avenue within the CVR measurement of challenge and threat states is through the parasympathetic nervous system. More recently, scholars have suggested and explored how the parasympathetic nervous system can relate to challenge and threat (Laborde et al., 2015; Meijen et al., 2020; Uphill et al., 2019). Both the TCTSA and the BPSM posit that CVR reflects changes within the sympathetic branch (i.e., SAM) and the HPA axis. However, also linked to the autonomic nervous system is the parasympathetic arms which is similarly active during stress response, by preparing the body for rest (Porges, 1995). As such, it is posited that it is the combination of the sympathetic and parasympathetic branches that reflected in changes in CVR (Feldman et al., 1999; Glick et al., 1965; Valenza et al., 2018). Moving beyond the CVR markers outlined the BPSM and TCTSA, other measures of the parasympathetic nervous system have been highlighted which include Heart Rate Variability (HRV; Ewing et al., 1984) and Respiratory Sinus Arrhythmia (RSA; Hill et al., 2009) which are usually recorded using an

electrocardiogram (ECG). HRV has been linked to challenge and threat appraisals (Laborde et al., 2015; Thornton et al., 2019). For example, Thornton et al. found higher HRV in those who received challenge instructions compared to threat instructions on approach to a motor task (hitting targets with a tennis ball). In another well controlled study, Poppelaars et al. (2019) explored the associations between social evaluative threat (impromptu speech task) with challenge and threat cognitive appraisals, sympathetic and parasympathetic nervous systems. Whilst controlling for sex, personality, and baseline stress levels, results revealed significant sympathetic activity (i.e., decrease in pre-ejection period), decrease in parasympathetic activity (decreases in RSA), increases in both sympathetic and parasympathetic activity (i.e., heart rate and blood pressure), and increases in peripheral HPA activity (i.e., cortisol) in response to the stress task. Interestingly, the study found no sex differences in stress reactivity when controlling for the menstrual cycle and personality (i.e., neuroticism). In sum, these alternative measurements offer some valuable alternatives to understanding the stress response than those physiological markers outlined in the BPSM and TCTSA. Drawing attention back to the social factors, there are also some useful considerations when examining the physiological activity within a social context.

Scholars have suggested that like emotions, the physiological state of an individual can be socially transmitted (Thorson et al., 2018). This is often referred to as physiological linkage (also known as synchrony, coregulation, compliance), which refers to the extent to which physiological signals (i.e., heart rate) are synchronised with others (Hatfield et al., 1993). Researchers have examined physiological linkage in couples (see Timmons et al., 2015 for review) and more specifically in line with challenge and threat (Oveis et al., 2020). Physiological linkage has typically been assessed by calculating certain physiological linkage scores (i.e., pre-

ejection period), and Thorson et al. (2018) outlines a comprehensive methodological approach to measuring the physiological process in dyads. In one study, Brown et al. (2020) assigned participants to undergo a stress task and to share a negative personal experience disclose (experiencer) with a partner (listener). Experiencers had lower negative affect during emotional disclosure, and lower sympathetic nervous system reactivity during a stressful task and disclosure, when that listener had higher emotional empathy. Also, those listeners with high emotional empathy reported greater negative affect in response to their partners distress during the stress task. Lastly, when more empathic listeners showed more accurate rating of their partner's emotion, they were more physiologically influenced by their partners. This highlights the interpersonal functions of empathy and how even a stranger's empathy can influence emotions and physiology. Future researchers could examine the relationship between physiological linkage and social support interactions to further understanding and provide novel insights regarding interpersonal dynamics and groups. This would require physiological measurements to be recorded throughout the interaction rather than just on anticipation towards the stressor as seen in the research within this thesis. Taken together, the following has outlined several alternative methods of measuring challenge and threat and more importantly some physiological indices associated with the stress. This is especially useful to offer innovative insights and theoretical advancements regarding the social factors in the stress response.

## **6.5 Conclusion**

The current thesis makes a novel contribution to challenge and threat, social support, and social identity literatures. One of the key contributions of this programme of research is the examination of social support alongside social/relational identification and challenge and threat including the resource appraisals within the TCTSA across five empirical studies. In turn, this

thesis goes some way to advance knowledge in the area of stress and coping by better understanding the psychosocial factors that can play a role in human stress response. In summary, through both cross-sectional and experimental evidence the present programme of research provides data of a strong relationship between social support and social/relational identification. There was also evidence of these social factors having a relationship with challenge and threat and the resource appraisals (self-efficacy, control, goal orientation) in line with the TCTSA. While no significant differences or relationships were found between CVR and the support conditions, sex differences did emerge across social support, challenge, and threat cognitive appraisals, CVR and performance outcomes. There was cross-sectional evidence to suggest that females reported greater perceived social support and higher self-report challenge appraisals than males. While experimental evidence suggested that females displayed CVR indicative of a challenge response and greater HR change, compared to males who displayed a more threatened response and less HR change towards the stress task. Females did report higher anxiety and being less confident and in control following the preparation period with a partner. This then reflected in performance, as males spoke for longer on the speech task indicating better performance, compared to females across two studies. These studies extend past research by utilising the established challenge and threat paradigm and exploring how social support and social identification can influence the self-report and CVR responses to stress. Future researchers could look to apply the challenge and threat framework to examine the interplay between these social factors and their role within helping individuals manage stress.

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## APPENDICES

### APPENDIX 1: INFORMATION SHEET, CONSENT FORM, AND QUESTIONNAIRES USED FOR CHAPTER TWO



#### Information Sheet

Dear Participant,

We are researchers in the School of Life Sciences & Education at Staffordshire University. As part of our research, we are interested in your current resilience, and in particular, the relationship between social support and well-being. By completing the survey you will help us understand resilience from your perspective. This may also help you to understand your own resilience and what steps you could take to enhance it.

What does it involve?

Your participation will involve completing an online questionnaire regarding perceptions of resilience. The participation in completing this questionnaire should take around 10 minutes.

Am I suitable for the study?

If you are currently suffering from a mental health condition, then unfortunately you are also unable to take part.

Do I have to take part?

Your participation is completely voluntary and you have the right to withdraw at any point without further consequence. If at any point you would like to withdraw please email me (Jamie Gillman) directly.

Are there any negatives from taking part?

It is unlikely that the study will cause risk or harm. However, If you experience any stress related symptoms after completing this study then please contact Mind on: 0300 123 3393/ info@mind.org.uk, or visit their website <http://www.mind.org.uk> for more information.

What will happen to my results and information?



Your results will not be identifiable to anybody, not us or your employer. Your employers will not see your individual results at any point, neither will we. The data you provide will be kept completely anonymous at all times and only myself and my supervisors (Dr Martin Turner, Dr Matthew Slater and Dr Jamie Barker) will see your anonymised data. We do not ask for your name or any other identifying information. All data will be kept secured and will be stored for up to 10 years in line with university policy.

Who can I contact if I have further questions regarding the study?

If you have any questions regarding your participation, please contact me via Jamie Gillman on [jamie.gillman@staffs.ac.uk](mailto:jamie.gillman@staffs.ac.uk).

Sincerely,

Jamie Gillman

\* NOTE: If you are completing the questionnaire on your mobile phone, it is best to hold the device landscape

### Consent Form

Please tick the appropriate boxes.

If you do not agree with any of the statements, unfortunately you are excluded from the study and are not required to complete the rest of the consent form:

	Agree	Disagree
I confirm that I have read and understood the information form for the survey.		
I am at least 18 years of age		
I understand that my participation is voluntary and I understand that I may withdraw my consent and discontinue participation at any time without further consequences.		
I agree and understand that the data collected will only be seen by the researchers. All data will be anonymous. All data will be stored safely on a password-protected computer		
I agree to take part in the above survey.		

## STUDY QUESTIONNAIRE

### Please provide us with some brief details about yourself

Date of birth (dd/mm/yy): .....

Age: .....

Sex (M/F): .....

How long have you been working for your current employer? .....

What is your role?.....

For work where are you based?.....

How long have you been working in this industry? .....

### ABSENTEEISM & PRESENTEEISM

About how many hours altogether did you work in the past 7 days? (If more than 97, enter 97.)

.....

How many hours does your employer expect you to work in a typical 7-day week?  
(If it varies, estimate the average. If more than 97, enter 97.)

.....

About how many hours altogether did you work in the past 4 weeks (28 days)? (See examples below.)

Number of hours in the past 4 weeks (28 days)

Examples for Calculating Hours Worked in the Past 4 Weeks

40 hours per week for 4 weeks = 160 hours

35 hours per week for 4 weeks = 140 hours

40 hours per week for 4 weeks with 2 8-hour days missed = 144 hours

40 hours per week for 4 weeks with 3 4-hour partial days missed = 148 hours

35 hours per week for 4 weeks with 2 8-hour days missed and 3 4-hour partial days missed =  
112 hours

.....

Using the same 0-to-10 scale, how would you rate your overall job performance **on the days you worked during the past 4 weeks (28 days)?**

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

**INTENTIONS TO QUIT**

	Strongly Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
If I have my own way, I will be working for my current employer one year from now					
I frequently think of quitting my job.					
I am planning to search for a new job in the next 12 months					

**SINGLE-ITEM SOCIAL IDENTIFICATION MEASURE**

To what extent do you agree or disagree with the following statements? By "workplace", we are referring to your place of work day to day. By "organisation" we are referring to your employer as a whole.

**“I identify with my organisation”**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**“I identify with my workplace colleagues”**



0 1 2 3 4 5

0 1 2 3 4 5

**(5) Hostile:**

**(13) Exciting:**

0 1 2 3 4 5

0 1 2 3 4 5

**(6) Challenging:**

**(14) Frightening:**

0 1 2 3 4 5

0 1 2 3 4 5

**(7) Stimulating:**

**(15) Terrifying:**

0 1 2 3 4 5

0 1 2 3 4 5

**(8) Exhilarating:**

**(16) Intolerable:**

0 1 2 3 4 5

0 1 2 3 4 5

**PERCEIVED STRESS SCALE**

The questions in the next scale will ask you about **your feelings and thoughts** during the stressful event. In each case, you will be asked to indicate by selecting **how often you felt or thought a certain way**.

During the time of the stressful work event, how often did you...

**0 = Never    1 = Almost Never    2 = Sometimes    3 = Fairly Often    4 = Very Often**

Get upset because of something that happened unexpectedly?	0	1	2	3	4
Feel that you were unable to control the important things in your life?	0	1	2	3	4
Feel nervous and “stressed”?	0	1	2	3	4

Feel confident about your ability to handle your personal problems?	0	1	2	3	4
Feel that things were going your way?	0	1	2	3	4
Find that you could not cope with all the things that you had to do?	0	1	2	3	4
Control irritations in your life?	0	1	2	3	4
Feel that you were on top of things?	0	1	2	3	4
Feel angered because of things that were outside of your control?	0	1	2	3	4
Feel difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

### **MULTIDIMENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT**

Instructions: We are interested in how you feel about the following statements **in relation to the stressful work event you described above**. Read each statement carefully. Indicate how you feel about each statement.

	Very Strongly Disagree		Neutral		Very Strongly Agree		
There was a special person who is around when I am in need	1	2	3	4	5	6	7
There was a special person whom I can share my joys and sorrows	1	2	3	4	5	6	7
My family really tried to help me	1	2	3	4	5	6	7
I got the emotional help and support I need from my family	1	2	3	4	5	6	7
I had a special person who is a real source of comfort to me	1	2	3	4	5	6	7
My friends really tried to help me	1	2	3	4	5	6	7
I could count on my friends when things go wrong	1	2	3	4	5	6	7

I could talk about my problems with my family	1	2	3	4	5	6	7
I had friends with whom I can share my joys and sorrows	1	2	3	4	5	6	7
There was a special person in my life who cares about my feelings	1	2	3	4	5	6	7
My family was willing to help me make decisions	1	2	3	4	5	6	7
I could talk about my problems with my friends	1	2	3	4	5	6	7

### **BRIEF MULTIDIMENSIONAL STUDENTS' LIFE SATISFACTION SCALE**

These six questions ask about your satisfaction with different areas of your life. Please select the best answer for each.

1. I would describe my satisfaction with my family life as:
 

a) Terrible	e) Mostly satisfied
b) Unhappy	f) Pleased
c) Mostly dissatisfied	g) Delighted
d) Mixed (about equally satisfied and dissatisfied)	
  
2. I would describe my satisfaction with my friendships as:
 

a) Terrible	e) Mostly satisfied
b) Unhappy	f) Pleased
c) Mostly dissatisfied	g) Delighted
d) Mixed (about equally satisfied and dissatisfied)	
  
3. I would describe my satisfaction with my workplace as
 

a) Terrible	e) Mostly satisfied
b) Unhappy	f) Pleased
c) Mostly dissatisfied	g) Delighted
d) Mixed (about equally satisfied and dissatisfied)	
  
4. I would describe my satisfaction with myself as:
 

a) Terrible	e) Mostly satisfied
b) Unhappy	f) Pleased
c) Mostly dissatisfied	g) Delighted
d) Mixed (about equally satisfied and dissatisfied)	
  
5. I would describe my satisfaction with where I live as:
 

a) Terrible	e) Mostly satisfied
b) Unhappy	f) Pleased
c) Mostly dissatisfied	g) Delighted

- d) Mixed (about equally satisfied and dissatisfied)
6. I would describe my satisfaction with my overall life as:
- |   |                     |
|---|---------------------|
| a) Terrible   | e) Mostly satisfied |
| b) Unhappy  | f) Pleased          |
| c) Mostly dissatisfied                              | g) Delighted        |
| d) Mixed (about equally satisfied and dissatisfied) |                     |

**This is the end of the study  
Thank you for completing the questions**

### **Debrief**

This study was interested in exploring the relationship between a person's identity and support within a group on their own perceptions of well-being. Research has shown that social support can have a positive effect on health and well-being. However, research is moving towards the idea that having a shared social identity is required in order to have optimal benefits for reducing levels of stress and improving well-being. The results from the study aims to see the strength of these relationships and to what extent this impacts overall life satisfaction.

The information and data you have provided will be anonymous and kept strictly confidential, and will only be seen by the lead researcher and possibly the project supervisors. If you would like any further information on how your results are going to be used, or you would like to withdraw from the study please contact: Jamie Gillman: [jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk) or the project supervisor: Dr Martin Turner: [M.Turner@staffs.ac.uk](mailto:M.Turner@staffs.ac.uk).

Furthermore, If you experience any stress related symptoms after completing this study, then please contact Mind on: 0300 123 3393/ [info@mind.org.uk](mailto:info@mind.org.uk), or visit their website <http://www.mind.org.uk> for more information.

Thank you again for your participation.

Jamie Gillman: [jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk)



**APPENDIX 2: INFORMATION SHEET, CONSENT FORM, AND QUESTIONNAIRES  
USED FOR CHAPTER THREE**



**Information Sheet**

Dear Participant,

I am a post-graduate student in the Faculty of Health Sciences at Staffordshire University. As part of my research I am interested in looking at the relationship between social support, stress, and a person's life satisfaction.

**What does it involve?**

Your participation will involve completing an online questionnaire regarding perceptions of social support, stress and general life satisfaction. The participation in completing this questionnaire should take around 20 mins.

**Am I suitable for the study?**

In order to take part you must be able to identify yourself to at least one of the following groups: a student, athlete, workplace employee, and/or a gym class exerciser. In addition all participants must be aged at least 18 years. Lastly, the questions asked relate around your own perceptions of stress. Therefore, if you are currently suffering from a mental health illness related to stress, then unfortunately you are also unable to take part.

**Do I have to take part?**

Your participation in this study is completely voluntary and you have the right to withdraw at any point without further consequence. You are able to withdraw from when you begin the research until two weeks after completion of the scales. If at any point you would like to withdraw please email the researcher (Jamie Gillman) directly.

It is suggested that you read this information form 24 hours before deciding whether to participate in the study.

**What are the benefits of taking part?**

On completion of the study you will be entered into a prize draw to win high street vouchers. There will be three prizes with 1st place receiving £50, 2nd place receiving £30 and 3rd place

receiving £20. In addition to this your participation will contribute to a greater understanding of how social support and social identity can impact life satisfaction.

### **Are there any negatives from taking part?**

It is unlikely that the study will cause risk or harm. However, If you experience any stress related symptoms after completing this study then please contact Mind on: 0300 123 3393/[info@mind.org.uk](mailto:info@mind.org.uk), or visit their website <http://www.mind.org.uk> for more information.

### **What will happen to my results and information?**

The data you provide will be kept anonymous at all times and only I and my supervisors (Dr Martin Turner, Dr Jamie Barker & Dr Matthew Slater) will see your data. All data will be kept secured and stored for up to 10 years in line with the university ethical guidelines.

### **Who can I contact if I have further questions regarding the study?**

If you have any questions regarding the research or your participation in this study, please contact the lead researcher via email: [jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk) or Dr Martin Turner on [M.Turner@staffs.ac.uk](mailto:M.Turner@staffs.ac.uk).

Sincerely,

Jamie Gillman, MSc, BSc, MBPsS

### **Consent Form**

Please tick the appropriate boxes.

If you do not agree with any of the statements, unfortunately you are excluded from the study and are not required to complete the rest of the consent form:

	Agree	Disagree
I am at least 18 years of age	<input type="checkbox"/>	<input type="checkbox"/>
I am not currently suffering from any mental health conditions related to stress.	<input type="checkbox"/>	<input type="checkbox"/>
I can identify myself with at least one of the following groups: student, athlete, employee, gym class exerciser.	<input type="checkbox"/>	<input type="checkbox"/>

I confirm that I have read and understood the information form for the project.	<input type="checkbox"/>
---	--------------------------

I understand that my participation is voluntary and I understand that I may withdraw my consent and discontinue participation at any time: from the study start date to the date the research has been submitted for publication, without further consequences.	
I agree and understand that the data collected for this study will only be seen by the lead researcher and supervisory team. All data will be stored safely on a password-protected computer.	
I agree to take part in the above study.	

**QUALTRICS QUESTIONNAIRE**

**Please provide us with some brief details about yourself**

Email address: .....

Date of birth (dd/mm/yy): .....

Age: .....

Sex (M/F): .....

**I am a student/workplace employee/athlete within a team/group exerciser,**

	Agree	Disagree
Agree/disagree?	<input type="checkbox"/>	<input type="checkbox"/>

**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.

**0 = Never    1 = Almost Never    2 = Sometimes    3 = Fairly Often    4 = Very Often**



### THE ACHIEVEMENT GOALS QUESTIONNAIRE

*Please consider your general thoughts and feeling towards being a student/workplace employee/athlete/group exerciser. Then, indicate the extent to which the following statements represent you:*

	Not at all True						Very True
It is important to me to perform as well as I possibly can	1	2	3	4	5	6	7
I worry that I may not perform as well as I possibly can	1	2	3	4	5	6	7
It is important to me to do well compared to others	1	2	3	4	5	6	7
I just want to avoid performing worse than others	1	2	3	4	5	6	7

### THE GENERAL SELF-EFFICACY SCALE

*Please indicate the extent to which each statement applies to you.*

*(1=Not at all true, 2= Hardly true, 3= Moderately True, 4= Exactly True)*

	Not at all True	Hardly True	Moderately True	Exactly True
I can always manage to solve difficult problems if I try hard enough	1	2	3	4
If someone opposes me, I can find the means and ways to get what I want	1	2	3	4
It is easy for me to stick to my aims and accomplish my goals	1	2	3	4

I am confident that I could deal efficiently with unexpected events	1	2	3	4
Thanks to my resourcefulness, I know how to handle unforeseen situations	1	2	3	4
I can solve most problems if I insist the necessary effort	1	2	3	4
I can remain calm when facing difficulties because I can rely on my coping abilities	1	2	3	4
When I am confronted with a problem, I can usually find several solutions	1	2	3	4
If I am in trouble, I can usually think of a solution	1	2	3	4
I can usually handle whatever comes my way	1	2	3	4

### **THE COGNITIVE APPRAISAL SCALE**

	Strongly Disagree				Strongly Agree	
I tend to focus on the positive aspects of any situation	1	2	3	4	5	6
I worry that I will say or do the wrong things	1	2	3	4	5	6
I often think about what it would be like if I do very well	1	2	3	4	5	6
I believe that most stressful situations contain the potential for positive benefits	1	2	3	4	5	6
I worry about the kind of impression I make	1	2	3	4	5	6

I am concerned that others will find fault with me	1	2	3	4	5	6
Overall I expect that I will achieve success rather than experience failure	1	2	3	4	5	6
In general I look forward to the rewards and benefits of success	1	2	3	4	5	6
Sometimes I think that I am too concerned with what other people think of me	1	2	3	4	5	6
I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4	5	6
I lack self-confidence	1	2	3	4	5	6
A challenging situation motivates me to increase my efforts	1	2	3	4	5	6
In general I anticipate being successful at my chosen pursuits, rather than expecting to fail	1	2	3	4	5	6
I worry what other people will think of me even when I know that it doesn't make any difference	1	2	3	4	5	6
I am concerned that others will not approve of me	1	2	3	4	5	6
I look forward to opportunities to fully test the limits of my skills and abilities	1	2	3	4	5	6
I worry about what other people may be thinking about me	1	2	3	4	5	6
I feel like a failure	1	2	3	4	5	6

**SINGLE-ITEM SOCIAL IDENTIFICATION MEASURE**

How far do you agree with the following statement?

**“I identify with my academic course / workplace / team / or exercise class”**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**MULTIDIMENSIONAL SCALE OF PERCEIVED SOCIAL SUPPORT**

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

	Very Strongly Disagree		Neutral			Very Strongly Agree	
There is a special person who is around when I am in need	1	2	3	4	5	6	7
There is a special person who whom I can share my joys and sorrows	1	2	3	4	5	6	7
My family really tries to help me	1	2	3	4	5	6	7
I get the emotional help and support I need from my family	1	2	3	4	5	6	7
I have a special person who is a real source of comfort to me	1	2	3	4	5	6	7
My friends really try to help me	1	2	3	4	5	6	7
I can count on my friends when things go wrong	1	2	3	4	5	6	7
I can talk about my problems with my family	1	2	3	4	5	6	7
I have friends with whom I can share my joys and sorrows	1	2	3	4	5	6	7
There is a special person in my life who cares about my feelings	1	2	3	4	5	6	7
My family is willing to help me make decisions	1	2	3	4	5	6	7
I can talk about my problems with my friends	1	2	3	4	5	6	7



**BRIEF MULTIDIMENSIONAL STUDENTS' LIFE SATISFACTION SCALE**

These six questions ask about your satisfaction with different areas of your life. Circle the best answer for each.

7. I would describe my satisfaction with my family life as:
- a) Terrible
  - b) Unhappy
  - c) Mostly dissatisfied
  - d) Mixed (about equally satisfied and dissatisfied)
  - e) Mostly satisfied
  - f) Pleased
  - g) Delighted
8. I would describe my satisfaction with my friendships as:
- a) Terrible
  - b) Unhappy
  - c) Mostly dissatisfied
  - d) Mixed (about equally satisfied and dissatisfied)
  - e) Mostly satisfied
  - f) Pleased
  - g) Delighted
9. I would describe my satisfaction with my course/workplace/ team/ exercise class as
- a) Terrible
  - b) Unhappy
  - c) Mostly dissatisfied
  - d) Mixed (about equally satisfied and dissatisfied)
  - e) Mostly satisfied
  - f) Pleased
  - g) Delighted
10. I would describe my satisfaction with myself as:
- a) Terrible
  - b) Unhappy
  - c) Mostly dissatisfied
  - d) Mixed (about equally satisfied and dissatisfied)
  - e) Mostly satisfied
  - f) Pleased
  - g) Delighted
11. I would describe my satisfaction with where I live as:
- a) Terrible
  - b) Unhappy
  - c) Mostly dissatisfied
  - d) Mixed (about equally satisfied and dissatisfied)
  - e) Mostly satisfied
  - f) Pleased
  - g) Delighted
12. I would describe my satisfaction with my overall life as:
- a) Terrible
  - b) Unhappy
  - c) Mostly dissatisfied
  - d) Mixed (about equally satisfied and dissatisfied)
  - e) Mostly satisfied
  - f) Pleased
  - g) Delighted

**This is the end of the study  
Thank you for completing the questions**

### **Debrief**

This study was interested in exploring the relationship between a person's identity and support within a group on their own perceptions of stress. Research has shown that social support can have a positive effect on health and well-being. However, research is growing in the idea that actually having a shared social identity is needed in order to have optimal benefits for reducing levels of stress. The results from the study aims to see the strength of these relationships and to what extent this impacts life satisfaction.

Thank you again for taking part in this research project. When the research project has been completed the winners of the prize draw will be contacted through email.

The information and data you have provided will be anonymous and kept strictly confidential, and will only be seen by the lead researcher and possibly the project supervisors. If you would like any further information on how your results are going to be used, or you would like to withdraw from the study please contact: Jamie Gillman: [jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk) or the project supervisor: Dr Martin Turner: [M.Turner@staffs.ac.uk](mailto:M.Turner@staffs.ac.uk).

Furthermore, If you experience any stress related symptoms after completing this study, then please contact Mind on: 0300 123 3393/ [info@mind.org.uk](mailto:info@mind.org.uk), or visit their website <http://www.mind.org.uk> for more information.

Thank you again for your participation.

Jamie Gillman

[jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk)

## APPENDIX 3: INFORMATION SHEET, CONSENT FORM, SCRIPT AND QUESTIONNAIRES USED FOR CHAPTER FOUR



### Information Sheet

Dear Participant,

I am a post-graduate researcher in the School of Life Sciences and Education at Staffordshire University. As part of my research I am interested in looking at the relationship between social factors and individual's responses to a stressful situation.

#### **What does it involve?**

Your participation will involve reading and completing a series of questions based around a hypothetical speech task. The study will take around 10 minutes to complete.

#### **Am I suitable for the study?**

All participants **must be aged at least 18 years**.

#### **Do I have to take part?**

Your participation in this study is completely voluntary and you have the right to withdraw at any time during the study, or up to two weeks after completion without further consequence. If at any point you would like to withdraw please email the researcher (Jamie Gillman) directly.

#### **What are the benefits of taking part?**

Although there may be no direct benefit to you by participating in the study, the possible benefit of your participation will contribute to a greater understanding of the relationship between social factors and individuals' responses.

#### **Are there any negatives from taking part?**

It is unlikely that the study will cause risk or harm. Although, participation may cause stress and anxiety in some individuals. However, if you experience any stress related symptoms after completing this study then please contact Mind on: 0300 123 3393/ info@mind.org.uk, or visit their website <http://www.mind.org.uk> for more information.

#### **What will happen to my results and information?**

The data you provide will be kept anonymous at all times and only I and my supervisors (Dr Martin Turner, Dr Matthew Slater, & Dr Jamie Barker) will see your data. All data will be kept secured and stored for up to 10 years in line with the university ethical guidelines. The results of the study will only be used for research and teaching purposes (i.e., research publications, conferences, & teaching).

**Who can I contact if I have further questions regarding the study?**

If you have any questions regarding the research or your participation in this study, please contact the lead researcher via email: [jamie.gillman@staffs.ac.uk](mailto:jamie.gillman@staffs.ac.uk) or Dr Martin Turner on [M.Turner@staffs.ac.uk](mailto:M.Turner@staffs.ac.uk).

Sincerely,

Jamie Gillman, MSc, BSc, MBPsS

**CONSENT FORM**

Please tick the appropriate boxes.

If you **do not** agree with any of the statements, unfortunately you are excluded from the study and are not required to complete the rest of the consent form:

I confirm that I have read and understood the information form for the above study and have had the opportunity to withdraw participation and/or ask questions.	
I am over 18 years of age	
I understand that my participation is voluntary and I understand that I may withdraw my consent and discontinue participation at any time, without further consequences.	
I agree that the data from the study can be used for research and teaching purposes (i.e., research publications, conferences, teaching)	
I agree to take part in the above study.	



**TASK INSTRUCTIONS**

**Please read the following:**

Imagine that you have been invited to an interview for your dream job.

You arrive for the interview, and you are told that at the start of the interview that you will have five minutes to speak uninterrupted and convince the interview panel that you are the best person for the job. To be clear, you are to give a five-minute speech about why you are suitable for the job. Your speech to the panel will be video recorded, and later viewed by an additional panel of recruitment experts so that they can judge your performance and see how you compare to other people. You have to talk for the full five minutes.

You will complete this speech alone, and you will have 5 minutes to prepare your speech. During this 5-minutes you must not make any notes.

**You now have two minutes to visualise this situation and imagine preparing for the upcoming interview speech.**

**Do you understand what is required? (Please circle)**

Yes

No

If you answered NO, please speak with the researcher

Imagine the situation you are faced with and answer the following questions in relation to the speech.

**PERCEIVED CONTROL**

*To what extent do you agree or disagree with the following statement? (Please circle)*

**“I feel that I have control over the situation to demonstrate my skills to the best of my ability”**

1	2	3	4	5
<b>Strongly disagree</b>				<b>Strongly agree</b>

**THE ACHIEVEMENT GOALS QUESTIONNAIRE**

Imagine the situation you are faced with and *consider your general thoughts and feeling towards the speech. Then, indicate the extent to which the following statements represent you:*

	Not at all True	1	2	3	4	5	6	7	Very True
It is important to me to perform as well as I possibly can	1	2	3	4	5	6	7		
I worry that I may not perform as well as I possibly can	1	2	3	4	5	6	7		

It is important to me to do well compared to other candidates    1        2        3        4        5        6        7

I just want to avoid performing worse than other candidates    1        2        3        4        5        6        7

### **SELF-EFFICACY SCALE**

**Imagine the situation you are faced with and rate how confident you feel in the following (Please circle):**

**1. Staying focused throughout?**

1                    2                    3                    4                    5

Not at all

Completely

**2. Speaking clearly throughout?**

1                    2                    3                    4                    5

Not at all

Completely

**3. Complete the task to the best of your ability?**

1                    2                    3                    4                    5

Not at all

Completely

**4. Perform when things get tough?**

1                    2                    3                    4                    5



Not at all

Completely

**5. Talking for the required time?**

1

2

3

4

5

Not at all

Completely

**6. Recover well if mistakes are made?**

1

2

3

4

5

Not at all

Completely

**7. Staying motivated?**

1

2

3

4

5

Not at all

Completely

**THE STATE-TRAIT ANXIETY SHORT FORM INVENTORY Y-6 ITEM**

*A number of statements which people have used to describe themselves are given below.*

**Imagine the situation you are faced with and read each statement and then indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.**

Not at all

Somewhat

Moderately

Very much

I feel calm	1	2	3	4
I am tense	1	2	3	4
I feel upset	1	2	3	4
I am relaxed	1	2	3	4
I feel content	1	2	3	4
I am worried	1	2	3	4

**Please now read the following:**

Imagine you have been given 5 minutes to prepare for your interview speech. The interview panel have given you a choice. You can choose to:

1. prepare alone,
2. prepare with a close friend or





I feel worried                    1                    2                    3                    4

I am content                    1                    2                    3                    4

**Imagine the situation you are faced with and rate how confident you feel in the following**  
**(Please circle):**

**1. Complete the task to the best of your ability?**

1                    2                    3                    4                    5

Not at all

Completely

**2. Speaking clearly throughout?**

1                    2                    3                    4                    5

Not at all

Completely

**3. Staying focused throughout?**

1                    2                    3                    4                    5

Not at all

Completely

**4. Recover well if mistakes are made?**

1                    2                    3                    4                    5

Not at all

Completely

**5. Staying motivated**

1

2

3

4

5

Not at all

Completely

**6. Perform when things get tough?**

1

2

3

4

5

Not at all

Completely

**7. Talking for the required time?**

1

2

3

4

5

Not at all

Completely

**Imagine the situation you are faced with and *consider your general thoughts and feeling towards the speech. Then, indicate the extent to which the following statements represent you:***

Not at  
all True

Very  
True

It is important to me to perform as well as I possibly can	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

I worry that I may not perform as well as I possibly can	1	2	3	4	5	6	7
---	---	---	---	---	---	---	---

It is important to me to do well compared to other candidates	1	2	3	4	5	6	7
--	---	---	---	---	---	---	---

I just want to avoid performing worse than other candidates	1	2	3	4	5	6	7
--	---	---	---	---	---	---	---

To what extent do you agree or disagree with the following statement? (Please circle)

**“I feel that I have control over the situation to demonstrate my skills to the best of my ability”**

1	2	3	4	5
<b>Strongly disagree</b>				<b>Strongly agree</b>

**END**

**SUPPLEMENTAL TABLE: CONTENT ANALYSIS OF THE REASONS FOR SUPPORT  
SELECTION (CHAPTER FOUR)**

<b>Condition</b>	<b>Categories</b>	<b>Frequency and percentage (%) of responders</b>	<b>Example</b>
Alone	Time to gather own thoughts and focus (with less distractions)	50 (61.7%)	“time to gather own thoughts and focus on own motivation and things I want to include in speech”
	Best person to decide qualities	13 (16%)	“I would be able to decide what my best qualities are and how I would be the best for that job”
	Sole responsibility for performance	8 (9.8%)	“Also, if I get the job/don’t get the job I can’t blame anyone else for not getting it or other people saying they got me the job”
	More confidence	5 (6.2%)	“I have more confidence when speaking by myself”
	Being alone in the interview	3 (3.7%)	“due to me being alone in the interview. Preparing with a friend may be useful for



	May receive bad advice	2 (2.5%)	<p>an indication but the friend won't be there with me"</p> <p>"As I am the person going for the job so people may give me bad advice if I work with other people from the interview."</p>
Friend	Share ideas/practice	30 (28.8%)	<p>"preparing with somebody that knows me will help me to bounce ideas across and perhaps elaborate or better articulate my points and practice explanations"</p>
	Provide honest support/feedback	27 (25.9%)	<p>"They would give me honest feedback to help me do my best"</p>
	Decreases anxiety/nerves (more relaxed)	19 (18.3%)	<p>"decreases nerves during preparation where the other 2 options would create anxiety to a degree"</p>
	Close friend knows me best	13 (12.5%)	<p>"Close friend will know how I can perform, knows what I am good at during speeches, knows me the best"</p> <p>"I feel more comfortable to prepare with a friend and won't be awkward to talk"</p>

	More comfortable talking to friend	12 (11.5%)	“they can help reassure me about how much I want this job and be brutally honest if my speech is good. Therefore, giving me extra motivation to do well”
	Extra motivation	3 (2.9%)	
Stranger	More practice	4 (28.6%)	“It would give me more practice to get myself together”
	Receive proper feedback	3 (21.4%)	“Because then I can get proper feedback which tells me how to improve on anything”
	No distractions	3 (21.4%)	“Would prefer to prepare with a person however if I was with a close friend, I may get distracted and go off topic”
	More relaxed	2 (14.3%)	“Speaking to a stranger would allow me to relax as I would have the ability to adapt”
	Not worried about performance	2 (14.3%)	“leave my comfort zone without being worried about my performance”

**APPENDIX 4: INFORMATION SHEET, CONSENT FORM, SCRIPTS AND  
QUESTIONNAIRES USED FOR CHAPTER FIVE (STUDY 1)**



Information Sheet

Dear Participant,

I am a post-graduate student in the School of Life Sciences and Education at Staffordshire University. As part of my research I am interested in looking at the relationship between social factors and cardiovascular responses to a situation.

**What does it involve?**

Your participation will involve a single session lasting around 45 minutes at one of our laboratories within the university. Part of the laboratory time will involve being connected to a cardiovascular recording machine while you listen to instructions about an upcoming task. A video camera will be set up to record the session. The study will also involve you being sent a short questionnaire to fill out online a week later.

**Am I suitable for the study?**

All participants must be aged at least 18 years. Furthermore, given the nature of the study if you are currently suffering from a mental health illness related to stress, then unfortunately you are also unable to take part.

The attachment of the cardiovascular recording equipment will involve a wrist and finger cuff strapped to you for around 30 minutes. If you have any conditions that mean you experience pain or discomfort in the wrist and fingers, or have any cardiovascular conditions, unfortunately you cannot take part in this study. In addition, the study requires you to listen to the experimenter and a set of audio instructions; therefore, if you have a hearing impairment, unfortunately you cannot take part in this study.

**Do I have to take part?**

Your participation in this study is completely voluntary and you have the right to withdraw at any time during the study, or up to two weeks after completion without further consequence. If at any point you would like to withdraw please email the researcher (Jamie Gillman) directly.

**What are the benefits of taking part?**

Although there may be no direct benefit to you by participating in the study, the possible benefit of your participation will contribute to a greater understanding of the relationship between social factors and cardiovascular responses.

**Are there any negatives from taking part?**

It is unlikely that the study will cause risk or harm. However, If you experience any stress related symptoms after completing this study then please contact Mind on: 0300 123 3393/ info@mind.org.uk, or visit their website <http://www.mind.org.uk> for more information.

**What will happen to my results and information?**

The data you provide will be kept anonymous at all times and only I and my supervisors (Dr Martin Turner, Dr Jamie Barker & Dr Matthew Slater) will see your data. All data will be kept secured and stored for up to 10 years in line with the university ethical guidelines.

**Who can I contact if I have further questions regarding the study?**

If you have any questions regarding the research or your participation in this study, please contact the lead researcher via email: [jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk) or Dr Martin Turner on [M.Turner@staffs.ac.uk](mailto:M.Turner@staffs.ac.uk).

Sincerely,

Jamie Gillman, MSc, BSc, MBPsS

**CONSENT FORM**

Please tick the appropriate boxes.

If you do not agree with any of the statements, unfortunately you are excluded from the study and are not required to complete the rest of the consent form:

	<b>Agree</b>
I am at least 18 years of age	
I am not currently suffering from any mental health conditions.	
I do not bruise easily	



**Please provide us with some brief details about yourself**

**Please create a unique code and make a note e.g. Jam23 (you will need this if you wish to withdraw from the study)**

Your unique identifier code:.....

Date of birth (dd/mm/yy): .....

Age: .....

Sex (M/F): .....

Height (cm): .....

Weight (kilograms): .....



**3. “The person sitting next to me will do the right things”**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**4. “I think that the person sitting next to me is trustworthy”**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**To what extend do you agree or disagree with the following statements in relation to the person sitting next to you?**

**5. I have complete faith in him/her**

1	2	3	4	5
Strongly Disagree				Strongly Agree

**6. I respect him/her**

1	2	3	4	5
Strongly Disagree				Strongly Agree



**7. I trust his/her judgement and decisions completely**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

**8. The person sitting next to me represents values that are important to me**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

**9. My values are similar to his/her values**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

**10. The person sitting next to me is a model for me to follow**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

### Relaxation Script (Audio)

*...make yourself comfortable...and gently allow your eyelids to close...and as you sit there...with your eyes comfortably closed...I want you to think of something pleasant...maybe a peaceful...tranquil scene...and I want you to let all the muscles of your body to go quite limp and slack...first...the muscles of your feet and ankles...let them relax...let them go...limp and slack...now...the muscles of your calves...let them go...limp and slack...allow them to relax...now the muscles of your thighs...let them relax...let them go...limp and slack allow them to relax...and already...you can feel a feeling of heaviness in your legs...your legs are beginning to feel as heavy as lead...let your legs go...as heavy as lead...let them relax completely...and as you do so...you are becoming drowsier and drowsier...you feel completely at peace...your mind calm and contented...you are really enjoying this very pleasant...drowsy feeling...and now...that feeling of relaxation is spreading upwards over the whole of your body...let your stomach muscles relax...let them go...limp and slack...now...the muscles of your chest...your body...and your back...let them go limp and slack...allow them to relax...and you can feel a feeling of heaviness in your body...as though your body is feeling just as heavy as lead...as if it is wanting to sink down...deeper and deeper into the chair...just let your body go...heavy as lead...let it sink comfortably into the chair...and as it does so...you are feeling drowsier and drowsier...just let yourself relax...more and more completely...you are feeling warm and comfortable...completely at peace...and that pleasant feeling of relaxation...is now spreading to your neck...your shoulders...and your arms...let your neck muscles relax...let them go...limp and slack...now the muscles of your shoulders...let them go limp and slack...allow them to relax...now the muscles of your arms...let them relax...let them go limp and slack...and you can feel a feeling of heaviness in your arms...as if your arms are becoming just as heavy as lead...just let your arms go...heavy as lead...let them relax completely...and as you sit there...all the way deep down...and comfortable in the chair...breathing freely and easily...you will find that with each breath you take you will become more and more relaxed.*

**Task instructions for pairs (Audio) 1<sup>st</sup> clip (Baseline T1)**

“Imagine that you have been invited to an interview for your “dream job”. You have five minutes to speak to and convince a panel watching through the video camera that you are the best person for the job. You are to give a five-minute speech to camera about why you are suitable for the job. Your speech will be video recorded, and later viewed by a panel of recruitment experts so they can judge your performance. It is important that you try your best and talk for the full five minutes.

**Both** of you are going to deliver a five-minute speech separately, but you work together to prepare for each other’s speech. You have 5 minutes to prepare for both speeches. During this 5 minutes you must not make any notes. When delivering your speeches, you will do so individually, and will not be allowed to use any notes. This task is very difficult and you may not have done anything like this before.

You now have two minutes to sit in silence (no interaction) and think about the upcoming interview speech. The researcher is not allowed to answer any questions at this time”

(2 Minutes Thinking Time)

Please answer the following questions in relation to the upcoming task

To what extent do you agree or disagree with the following statement? (Please circle)

**“I feel that I have control over the situation to demonstrate my skills to the best of my ability”**

1	2	3	4	5
<b>Strongly disagree</b>				<b>Strongly agree</b>

*Please consider your general thoughts and feeling towards the task. Then, indicate the extent to which the following statements represent you:*

	Not at all True						Very True
It is important to me to perform as well as I possibly can	1	2	3	4	5	6	7
I worry that I may not perform as well as I possibly can	1	2	3	4	5	6	7
It is important to me to do well compared to others	1	2	3	4	5	6	7
I just want to avoid performing worse than others	1	2	3	4	5	6	7

Please rate how confident you feel in the following (Please circle):

**8. Staying focused throughout?**

1                    2                    3                    4                    5

Not at all

Completely

**9. Speaking clearly throughout?**

1                    2                    3                    4                    5

Not at all

Completely

**10. Complete the task to the best of your ability?**

1                    2                    3                    4                    5

Not at all

Completely

**11. Perform when things get tough?**

1                    2                    3                    4                    5

Not at all

Completely

**12. Talking for the required time?**

1                    2                    3                    4                    5

Not at all

Completely

**13. Recover well if mistakes are made?**

1                    2                    3                    4                    5

Not at all

Completely

**14. Staying motivated?**

1                    2                    3                    4                    5

Not at all

Completely

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel **right now**, that is, **at this moment**. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm.....	①	②	③	④
2. I feel secure.....	①	②	③	④
3. I am tense.....	①	②	③	④
4. I feel strained.....	①	②	③	④
5. I feel at ease.....	①	②	③	④
6. I feel upset.....	①	②	③	④
7. I am presently worrying over possible misfortunes.....	①	②	③	④
8. I feel satisfied.....	①	②	③	④
9. I feel frightened.....	①	②	③	④
10. I feel comfortable.....	①	②	③	④
11. I feel self-confident.....	①	②	③	④
12. I feel nervous.....	①	②	③	④
13. I am jittery.....	①	②	③	④
14. I feel indecisive.....	①	②	③	④
15. I am relaxed.....	①	②	③	④
16. I feel content.....	①	②	③	④
17. I am worried.....	①	②	③	④
18. I feel confused.....	①	②	③	④
19. I feel steady.....	①	②	③	④
20. I feel pleasant.....	①	②	③	④

## **Speech Preparation – 5 Minutes**





Disagree

agree

4) This person did not show much empathy for my situation

1

2

3

4

Strongly  
Disagree

Strongly  
agree

5) This person criticized me

1

2

3

4

Strongly  
Disagree

Strongly  
agree

6) This person made me feel valued and important

1

2

3

4

Strongly  
Disagree

Strongly  
agree

7) This person expressed concern about my situation

1

2

3

4

Strongly  
Disagree

Strongly  
agree

8) This person assured me that I can rely completely on him/her

1

2

3

4

Strongly  
Disagree

Strongly  
agree

9) This person encouraged me not to give up

1

2

3

4

Strongly  
Disagree

Strongly  
agree

10) This person was there when I needed him/her

1

2

3

4

Strongly  
Disagree

Strongly  
agree

11) This person took care of many things for me

1

2

3

4

Strongly  
disagree

Strongly  
agree

12) This person took care of things I could not manage on my own

1	2	3	4
Strongly Disagree			Strongly agree

13) This person helped me find something positive in my situation

1	2	3	4
Strongly disagree			Strongly agree

14) This person suggested activities that might distract me

1	2	3	4
Strongly disagree			Strongly agree

**To what extent do you agree or disagree with the following statement? (Please circle)**

**(1) strongly disagree (2) somewhat disagree (3) somewhat agree (4) strongly agree**

1) I showed him/her how much I cherish and accept them

1	2	3	4
Strongly Disagree			Strongly agree

2) I comforted him/her

1	2	3	4
Strongly Disagree			Strongly agree

3) I left him/her alone

1	2	3	4
Strongly Disagree			Strongly agree

4) I did not have much empathy for him/her

- |   |                      |   |   |                   |
|---|----------------------|---|---|-------------------|
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 5) I criticized him/her   |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 6) I made him/her feel valued and important                         |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 7) I expressed concern about their situation                        |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 8) I reassured him/her that they can rely completely on me          |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 9) I encouraged him/her not to give up                              |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 10) I was there when he/she needed me                               |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>Disagree |   |   | Strongly<br>agree |
| 11) I did a lot for him/her   |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |
|   | Strongly<br>disagree |   |   | Strongly<br>agree |
| 12) I took care of things that he/she could not fulfil on their own |                      |   |   |                   |
|   | 1                    | 2 | 3 | 4                 |

Strongly  
Disagree

Strongly  
agree

13) I helped them find something positive in their situation

1  
Strongly  
disagree

2

3

4  
Strongly  
agree

14) I suggested an activity that might distract them

1  
Strongly  
disagree

2

3

4  
Strongly  
agree

**(Please now wait to be connected back up the recording equipment)**

## Relaxation Script (Audio)

*...make yourself comfortable...and gently allow your eyelids to close...and as you sit there...with your eyes comfortably closed...I want you to think of something pleasant...maybe a peaceful...tranquil scene...and I want you to let all the muscles of your body to go quite limp and slack...first...the muscles of your feet and ankles...let them relax...let them go...limp and slack...now...the muscles of your calves...let them go...limp and slack...allow them to relax...now the muscles of your thighs...let them relax...let them go...limp and slack allow them to relax...and already...you can feel a feeling of heaviness in your legs...your legs are beginning to feel as heavy as lead...let your legs go...as heavy as lead...let them relax completely...and as you do so...you are becoming drowsier and drowsier...you feel completely at peace...your mind calm and contented...you are really enjoying this very pleasant...drowsy feeling...and now...that feeling of relaxation is spreading upwards over the whole of your body...let your stomach muscles relax...let them go...limp and slack...now...the muscles of your chest...your body...and your back...let them go limp and slack...allow them to relax...and you can feel a feeling of heaviness in your body...as though your body is feeling just as heavy as lead...as if it is wanting to sink down...deeper and deeper into the chair...just let your body go...heavy as lead...let it sink comfortably into the chair...and as it does so...you are feeling drowsier and drowsier...just let yourself relax...more and more completely...you are feeling warm and comfortable...completely at peace...and that pleasant feeling of relaxation...is now spreading to your neck...your shoulders...and your arms...let your neck muscles relax...let them go...limp and slack...now the muscles of your shoulders...let them go limp and slack...allow them to relax...now the muscles of your arms...let them relax...let them go limp and slack...and you can feel a feeling of heaviness in your arms...as if your arms are becoming just as heavy as lead...just let your arms go...heavy as lead...let them relax completely...and as you sit there...all the way deep down...and comfortable in the chair...breathing freely and easily...you will find that with each breath you take you will become more and more relaxed.*

### Task instructions for pairs (Audio)- 2<sup>nd</sup> clip (T2)

You are about to carry out the speech task.

As a reminder...

“Imagine that you have been invited to an interview for your “dream job”. You have five minutes to speak to and convince a panel watching through the video camera that you are the best person for the job. You are to give a five-minute speech to camera about why you are suitable for the job. Your speech will be video recorded, and later viewed by a panel of recruitment experts so they can judge your performance. It is important that you try your best and talk for the full five minutes.

**Both** of you are going to deliver a five-minute speech separately. When delivering your speeches, you will do so individually, and will not be allowed to use any notes. This task is very difficult and you may not have done anything like this before.

You now have two minutes to sit in silence (no interaction) and think about the upcoming interview speech. The researcher is not allowed to answer any questions at this time”

(2 Minutes Thinking Time)

**Please answer the following questions in relation to the upcoming task**

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel **right now**, that is, **at this moment**. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm.....	①	②	③	④
2. I feel secure.....	①	②	③	④
3. I am tense.....	①	②	③	④
4. I feel strained.....	①	②	③	④
5. I feel at ease.....	①	②	③	④
6. I feel upset.....	①	②	③	④
7. I am presently worrying over possible misfortunes.....	①	②	③	④
8. I feel satisfied.....	①	②	③	④
9. I feel frightened.....	①	②	③	④
10. I feel comfortable.....	①	②	③	④
11. I feel self-confident.....	①	②	③	④
12. I feel nervous.....	①	②	③	④
13. I am jittery.....	①	②	③	④
14. I feel indecisive.....	①	②	③	④
15. I am relaxed.....	①	②	③	④
16. I feel content.....	①	②	③	④
17. I am worried.....	①	②	③	④
18. I feel confused.....	①	②	③	④
19. I feel steady.....	①	②	③	④
20. I feel pleasant.....	①	②	③	④



**To what extent do you agree or disagree with the following statement? (Please circle)**

**“I feel that I have control over the situation to demonstrate my skills to the best of my ability”**

1	2	3	4	5
<b>Strongly disagree</b>				<b>Strongly agree</b>

**Please rate how confident you feel in the following (Please circle):**

**1. Staying focused throughout?**

1	2	3	4	5
Not at all				Completely

**2. Speaking clearly throughout?**

1	2	3	4	5
Not at all				Completely

**3. Complete the task to the best of your ability?**

1	2	3	4	5
---	---	---	---	---

Not at all

Completely

**4. Perform when things get tough?**

1            2            3            4            5

Not at all

Completely

**5. Talking for the required time?**

1            2            3            4            5

Not at all

Completely

**6. Recover well if mistakes are made?**

1            2            3            4            5

Not at all

Completely

**7. Staying motivated?**

1            2            3            4            5

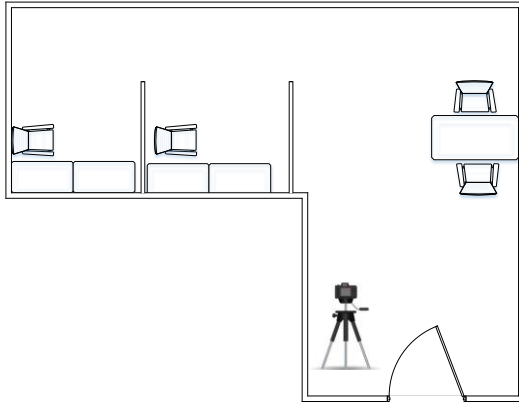
Not at all

Completely

*Please consider your general thoughts and feeling towards the task. Then, indicate the extent to which the following statements represent you:*

	Not at all True						Very True
It is important to me to perform as well as I possibly can	1	2	3	4	5	6	7
I worry that I may not perform as well as I possibly can	1	2	3	4	5	6	7
It is important to me to do well compared to others	1	2	3	4	5	6	7
I just want to avoid performing worse than others	1	2	3	4	5	6	7

**SUPPLEMENTAL MATERIAL: A DIAGRAM OF THE LABORATORY SET UP**



## APPENDIX 5: INFORMATION SHEET, CONSENT FORM, SCRIPTS AND QUESTIONNAIRES USED FOR CHAPTER FIVE (STUDY 2)



### Information Sheet

Dear Participant,

I am a post-graduate student in the Faculty of Health Sciences at Staffordshire University. As part of my research I am interested in looking at the relationship between social factors and cardiovascular responses to a situation.

#### **What does it involve?**

Your participation will involve a single session lasting around 45 minutes at one of our laboratories within the university. Part of the laboratory time will involve being connected to a cardiovascular recording machine while you listen to instructions about an upcoming task. A video camera will be set up to record the session. The study will also involve you being sent a short questionnaire to fill out online a week later.

#### **Am I suitable for the study?**

All participants must be aged at least 18 years. Furthermore, given the nature of the study if you are currently suffering from a mental health illness related to stress, then unfortunately you are also unable to take part.

The attachment of the cardiovascular recording equipment will involve a wrist and finger cuff strapped to you for around 30 minutes. If you have any conditions that mean you experience pain or discomfort in the wrist and fingers, or have any cardiovascular conditions, unfortunately you cannot take part in this study. In addition, the study requires you to listen to the experimenter and a set of audio instructions; therefore, if you have a hearing impairment, unfortunately you cannot take part in this study.

#### **Do I have to take part?**

Your participation in this study is completely voluntary and you have the right to withdraw at any time during the study, or up to two weeks after completion without further consequence. If at any point you would like to withdraw please email the researcher (Jamie Gillman) directly.

#### **What are the benefits of taking part?**

Although there may be no direct benefit to you by participating in the study, the possible benefit of your participation will contribute to a greater understanding of the relationship between social factors and cardiovascular responses.

**Are there any negatives from taking part?**

It is unlikely that the study will cause risk or harm. However, If you experience any stress related symptoms after completing this study then please contact Mind on: 0300 123 3393/ info@mind.org.uk, or visit their website <http://www.mind.org.uk> for more information.

**What will happen to my results and information?**

The data you provide will be kept anonymous at all times and only I and my supervisors (Dr Martin Turner, Dr Jamie Barker & Dr Matthew Slater) will see your data. All data will be kept secured and stored for up to 10 years in line with the university ethical guidelines.

**Who can I contact if I have further questions regarding the study?**

If you have any questions regarding the research or your participation in this study, please contact the lead researcher via email: [jamie.gillman@research.staffs.ac.uk](mailto:jamie.gillman@research.staffs.ac.uk) or Dr Martin Turner on [M.Turner@staffs.ac.uk](mailto:M.Turner@staffs.ac.uk).

Sincerely,

Jamie Gillman, MSc, BSc, MBPsS

**CONSENT FORM**

Please tick the appropriate boxes.

If you do not agree with any of the statements, unfortunately you are excluded from the study and are not required to complete the rest of the consent form:

	<b>Agree</b>
I am at least 18 years of age	
I am not currently suffering from any mental health conditions.	
I do not bruise easily	



**Please provide us with some brief details about yourself**

**Please create a unique code and make a note e.g. Jam23 (you will need this if you wish to withdraw from the study)**

Your unique identifier code:.....

Date of birth (dd/mm/yy): .....

Age: .....

Sex (M/F): .....

Height (cm): .....

Weight (kilograms): .....



## THE BIG FIVE INVENTORY–2

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which you agree or disagree with that statement.

<b>1</b> Disagree strongly	<b>2</b> Disagree a little	<b>3</b> Neutral; no opinion	<b>4</b> Agree a little	<b>5</b> Agree strongly
----------------------------------	----------------------------------	------------------------------------	-------------------------------	-------------------------------

### *I am someone who...*

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. ___ Is outgoing, sociable.</li> <li>2. ___ Is compassionate, has a soft heart.</li> <li>3. ___ Tends to be disorganized.</li> <li>4. ___ Is relaxed, handles stress well.</li> <li>5. ___ Has few artistic interests.</li> <li>6. ___ Has an assertive personality.</li> <li>7. ___ Is respectful, treats others with respect.</li> <li>8. ___ Tends to be lazy.</li> <li>9. ___ Stays optimistic after experiencing a setback.</li> <li>10. ___ Is curious about many different things.</li> <li>11. ___ Rarely feels excited or eager.</li> <li>12. ___ Tends to find fault with others.</li> <li>13. ___ Is dependable, steady.</li> <li>14. ___ Is moody, has up and down mood swings.</li> <li>15. ___ Is inventive, finds clever ways to do things.</li> <li>16. ___ Tends to be quiet.</li> <li>17. ___ Feels little sympathy for others.</li> <li>18. ___ Is systematic, likes to keep things in order.</li> <li>19. ___ Can be tense.</li> <li>20. ___ Is fascinated by art, music, or literature.</li> <li>21. ___ Is dominant, acts as a leader.</li> <li>22. ___ Starts arguments with others.</li> <li>23. ___ Has difficulty getting started on tasks.</li> <li>24. ___ Feels secure, comfortable with self.</li> <li>25. ___ Avoids intellectual, philosophical discussions.</li> <li>26. ___ Is less active than other people.</li> <li>27. ___ Has a forgiving nature.</li> <li>28. ___ Can be somewhat careless.</li> <li>29. ___ Is emotionally stable, not easily upset.</li> <li>30. ___ Has little creativity.</li> </ol> | <ol style="list-style-type: none"> <li>31. ___ Is sometimes shy, introverted.</li> <li>32. ___ Is helpful and unselfish with others.</li> <li>33. ___ Keeps things neat and tidy.</li> <li>34. ___ Worries a lot.</li> <li>35. ___ Values art and beauty.</li> <li>36. ___ Finds it hard to influence people.</li> <li>37. ___ Is sometimes rude to others.</li> <li>38. ___ Is efficient, gets things done.</li> <li>39. ___ Often feels sad.</li> <li>40. ___ Is complex, a deep thinker.</li> <li>41. ___ Is full of energy.</li> <li>42. ___ Is suspicious of others' intentions.</li> <li>43. ___ Is reliable, can always be counted on.</li> <li>44. ___ Keeps their emotions under control.</li> <li>45. ___ Has difficulty imagining things.</li> <li>46. ___ Is talkative.</li> <li>47. ___ Can be cold and uncaring.</li> <li>48. ___ Leaves a mess, doesn't clean up.</li> <li>49. ___ Rarely feels anxious or afraid.</li> <li>50. ___ Thinks poetry and plays are boring.</li> <li>51. ___ Prefers to have others take charge.</li> <li>52. ___ Is polite, courteous to others.</li> <li>53. ___ Is persistent, works until the task is finished.</li> <li>54. ___ Tends to feel depressed, blue.</li> <li>55. ___ Has little interest in abstract ideas.</li> <li>56. ___ Shows a lot of enthusiasm.</li> <li>57. ___ Assumes the best about people.</li> <li>58. ___ Sometimes behaves irresponsibly.</li> <li>59. ___ Is temperamental, gets emotional easily.</li> <li>60. ___ Is original, comes up with new ideas.</li> </ol> |
|---|--|

Please check: Did you write a number in front of each statement?

**The next series of questions ask you about your relationship with the other person doing the study (the person sitting in the next booth)**

1. How long have you known this person?

I don't know this person    we only just met    Less than 6 months    6-12 months    over 1 year

2. How close are you with this person?

Not at all close    somewhat close    close    very close

**To what extent do you agree or disagree with the following statements?**

3. "I identify with the person sitting next to me"

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

4. "I trust the person sitting next to me absolutely"

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**5. “The person sitting next to me will do the right things”**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**6. “I think that the person sitting next to me is trustworthy”**

1	2	3	4	5	6	7
Strongly Disagree						Strongly Agree

**To what extent do you agree or disagree with the following statements in relation to the person sitting next to you?**

**7. I have complete faith in him/her**

1	2	3	4	5
Strongly Disagree				Strongly Agree

**8. I respect him/her**

1	2	3	4	5
Strongly Disagree				Strongly Agree

**9. I trust his/her judgement and decisions completely**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

**10. The person sitting next to me represents values that are important to me**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

**11. My values are similar to his/her values**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

**12. The person sitting next to me is a model for me to follow**

1	2	3	4	5
Strongly				Strongly
Disagree				Agree

### Relaxation Script (Audio)

*...make yourself comfortable...and gently allow your eyelids to close...and as you sit there...with your eyes comfortably closed...I want you to think of something pleasant...maybe a peaceful...tranquil scene...and I want you to let all the muscles of your body to go quite limp and slack...first...the muscles of your feet and ankles...let them relax...let them go...limp and slack...now...the muscles of your calves...let them go...limp and slack...allow them to relax...now the muscles of your thighs...let them relax...let them go...limp and slack allow them to relax...and already...you can feel a feeling of heaviness in your legs...your legs are beginning to feel as heavy as lead...let your legs go...as heavy as lead...let them relax completely...and as you do so...you are becoming drowsier and drowsier...you feel completely at peace...your mind calm and contented...you are really enjoying this very pleasant...drowsy feeling...and now...that feeling of relaxation is spreading upwards over the whole of your body...let your stomach muscles relax...let them go...limp and slack...now...the muscles of your chest...your body...and your back...let them go limp and slack...allow them to relax...and you can feel a feeling of heaviness in your body...as though your body is feeling just as heavy as lead...as if it is wanting to sink down...deeper and deeper into the chair...just let your body go...heavy as lead...let it sink comfortably into the chair...and as it does so...you are feeling drowsier and drowsier...just let yourself relax...more and more completely...you are feeling warm and comfortable...completely at peace...and that pleasant feeling of relaxation...is now spreading to your neck...your shoulders...and your arms...let your neck muscles relax...let them go...limp and slack...now the muscles of your shoulders...let them go limp and slack...allow them to relax...now the muscles of your arms...let them relax...let them go limp and slack...and you can feel a feeling of heaviness in your arms...as if your arms are becoming just as heavy as lead...just let your arms go...heavy as lead...let them relax completely...and as you sit there...all the way deep down...and comfortable in the chair...breathing freely and easily...you will find that with each breath you take you will become more and more relaxed.*

**Task instructions for pairs (Audio)**

“Imagine that you have been invited to an interview for your “dream job”. You have five minutes to speak to and convince a panel watching through the video camera that you are the best person for the job. You are to give a five-minute speech to camera about why you are suitable for the job. Your speech will be video recorded, and later viewed by a panel of recruitment experts so they can judge your performance. It is important that you try your best and talk for the full five minutes.

**Both** of you are going to deliver a five-minute speech separately, but you work together to prepare for each other’s speech. You have 5 minutes to prepare for both speeches. During this 5 minutes you must not make any notes. When delivering your speeches, you will do so individually, and will not be allowed to use any notes. This task is very difficult and you may not have done anything like this before.

You now have two minutes to sit in silence (no interaction) and think about the upcoming interview speech. The researcher is not allowed to answer any questions at this time”

**OR**

**Task instructions for individual (Audio)**

“Imagine that you have been invited to an interview for your “dream job”. You have five minutes to speak to and convince a panel watching through the video camera that you are the best person for the job. You are to give a five-minute speech to camera about why you are suitable for the job. Your speech will be video recorded, and later viewed by a panel of recruitment experts so they can judge your performance. It is important that you try your best and talk for the full five minutes.

You will complete this presentation alone, and will have 5 minutes to prepare your speech. During this 5 minutes you must not make any notes. This task is difficult and you may not have done anything like this before.

You now have two minutes to sit in silence to think about the upcoming speech. The researcher is not allowed to answer any questions at this time”

(2 Minutes Thinking Time)

**Please answer the following questions in relation to the upcoming task**

**To what extent do you agree or disagree with the following statement? (Please circle)**

**“I feel that I have control over the situation to demonstrate my skills to the best of my ability”**

1	2	3	4	5
<b>Strongly disagree</b>				<b>Strongly agree</b>

***Please consider your general thoughts and feeling towards the task. Then, indicate the extent to which the following statements represent you:***

	Not at all True						Very True
It is important to me to perform as well as I possibly can	1	2	3	4	5	6	7
I worry that I may not perform as well as I possibly can	1	2	3	4	5	6	7
It is important to me to do well compared to others	1	2	3	4	5	6	7
I just want to avoid performing worse than others	1	2	3	4	5	6	7

**Please rate how confident you feel in the following (Please circle):**

**1. Staying focused throughout?**

1                      2                      3                      4                      5

Not at all

Completely

**2. Speaking clearly throughout?**

1                      2                      3                      4                      5

Not at all

Completely

**3. Complete the task to the best of your ability?**

1                      2                      3                      4                      5

Not at all

Completely

**4. Perform when things get tough?**

1                      2                      3                      4                      5



Not at all

Completely

**5. Talking for the required time?**

1

2

3

4

5

Not at all

Completely

**6. Recover well if mistakes are made?**

1

2

3

4

5

Not at all

Completely

**7. Staying motivated?**

1

2

3

4

5

Not at all

Completely

Directions: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right now*, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm.....	①	②	③	④
2. I feel secure.....	①	②	③	④
3. I am tense.....	①	②	③	④
4. I feel strained.....	①	②	③	④
5. I feel at ease.....	①	②	③	④
6. I feel upset.....	①	②	③	④
7. I am presently worrying over possible misfortunes.....	①	②	③	④
8. I feel satisfied.....	①	②	③	④
9. I feel frightened.....	①	②	③	④
10. I feel comfortable.....	①	②	③	④
11. I feel self-confident.....	①	②	③	④
12. I feel nervous.....	①	②	③	④
13. I am jittery.....	①	②	③	④
14. I feel indecisive.....	①	②	③	④
15. I am relaxed.....	①	②	③	④
16. I feel content.....	①	②	③	④
17. I am worried.....	①	②	③	④
18. I feel confused.....	①	②	③	④
19. I feel steady.....	①	②	③	④
20. I feel pleasant.....	①	②	③	④

**Speech Preparation – 5 Minutes**

**(TO BE FILLED IN AT THE END- ONLY IF IN SUPPORT CONDITION)****To what extent do you agree or disagree with the following statement? (Please circle)**

“I felt supported by the other person”

1	2	3	4	5	6
					<i>very</i>
<i>Not at all</i>					

“The presence of the other person had a relaxing influence on me”

1	2	3	4	5	6
					<i>very</i>
<i>Not at all</i>					

**To what extent do you agree or disagree with the following statement? (Please circle)****(2) strongly disagree (2) somewhat disagree (3) somewhat agree (4) strongly agree**

1) The person showed me that he/she loves and accepts me.

1	2	3	4
Strongly Disagree			Strongly agree

2) This person comforted me

1	2	3	4
Strongly Disagree			Strongly agree

3) This person left me alone

1	2	3	4
Strongly Disagree			Strongly agree

4) This person did not show much empathy for my situation

- |  |          |   |   |          |
|--|----------|---|---|----------|
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 5) This person criticized me                                     |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 6) This person made me feel valued and important                 |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 7) This person expressed concern about my situation              |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 8) This person assured me that I can rely completely on him/her  |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 9) This person encouraged me not to give up                      |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 10) This person was there when I needed him/her                  |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | Disagree |   |   | agree    |
| 11) This person took care of many things for me                  |          |   |   |          |
|  | 1        | 2 | 3 | 4        |
|  | Strongly |   |   | Strongly |
|  | disagree |   |   | agree    |
| 12) This person took care of things I could not manage on my own |          |   |   |          |

1	2	3	4
Strongly Disagree			Strongly agree

13) This person helped me find something positive in my situation

1	2	3	4
Strongly disagree			Strongly agree

14) This person suggested activities that might distract me

1	2	3	4
Strongly disagree			Strongly agree

**To what extent do you agree or disagree with the following statement? (Please circle)**

**(1) strongly disagree (2) somewhat disagree (3) somewhat agree (4) strongly agree**

1) I showed him/her how much I cherish and accept them

1	2	3	4
Strongly Disagree			Strongly agree

2) I comforted him/her

1	2	3	4
Strongly Disagree			Strongly agree

3) I left him/her alone

1	2	3	4
Strongly Disagree			Strongly agree

4) I did not have much empathy for him/her

1	2	3	4
Strongly Disagree			Strongly agree

5) I criticized him/her

- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 6) I made him/her feel valued and important
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 7) I expressed concern about their situation
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 8) I reassured him/her that they can rely completely on me
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 9) I encouraged him/her not to give up
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 10) I was there when he/she needed me
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 11) I did a lot for him/her
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>disagree |   |   | Strongly<br>agree |
- 12) I took care of things that he/she could not fulfil on their own
- |  |                      |   |   |                   |
|--|----------------------|---|---|-------------------|
|  | 1                    | 2 | 3 | 4                 |
|  | Strongly<br>Disagree |   |   | Strongly<br>agree |
- 13) I helped them find something positive in their situation

1	2	3	4
Strongly disagree			Strongly agree

14) I suggested an activity that might distract them

1	2	3	4
Strongly disagree			Strongly agree