IMPACT OF A MULTIMODAL COGNITIVE BEHAVIOURAL INTERVENTION ON STRESS MINDSET, IRRATIONAL BELIEFS, AND PERFORMANCE PERCEPTION IN FEMALE SOCCER PLAYERS

IMPACTO DE UMA INTERVENÇÃO COGNITIVO-COMPORTAMENTAL MULTIMODAL NA MENTALIDADE DE ESTRESSE, CRENÇAS IRRACIONAIS E PERCEPÇÃO DE DESEMPENHO EM JOGADORAS DE FUTEBOL

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Abstract
The mental health of female athletes has received increasing attention, but many teams lack adequate psychological support. This study tested a novel multimodal cognitive-behavioural intervention, based on Rational Emotive Behavioural Therapy (REBT), with insights into stress mindset, threat and challenge appraisals, self-compassion and mental imagery. Fourteen one-time top-flight football players from the Republic of Ireland participated in six sessions, with assessments at baseline, post-intervention and two-week follow-up. Results revealed significant increases in stress mindset and reductions in self-deprecation, 'getting worse' behaviour and low frustration tolerance, with effects maintained at follow-up. No significant changes in perceived performance or traits were observed, suggesting that such an intervention could significantly modify stress mindset and irrational traits in female athletes.
Keywords: Mental health; Female athletes; Cognitive-behavioral intervention.

Resumo
A saúde mental de atletas femininas tem recebido cada vez mais atenção, mas muitas equipes carecem de apoio psicológico adequado. Este estudo testou uma nova intervenção cognitivo-comportamental multimodal, fundamentada na Terapia Racional Emotivo-Comportamental (TREC), incorporada à teoria da mentalidade de estresse, avaliações de desafios e ameaças, autocompaixão e imagens mentais. Quatorze jogadoras de futebol de um time de primeira divisão da República da Irlanda participaram de seis sessões, com avaliações no início do estudo, após a intervenção e após duas semanas de acompanhamento. Os resultados revelaram um aumento significativo na mentalidade de estresse e reduções na autodepreciação, no comportamento de "*worsening*" e na baixa tolerância à frustração, com efeitos mantidos no acompanhamento. Não foram observadas mudanças significativas na exigência ou no desempenho percebido, o que sugere que tal intervenção pode modificar efetivamente a mentalidade de estresse e as crenças irracionais em atletas femininas.
Palavras-chave: Saúde mental; Atletas femininas; Intervenção cognitivo-comportamental.

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1 INTRODUCTION

Athlete wellbeing has garnered increasing attention, with research highlighting a high prevalence of mental health concerns in elite sport (Prinz et al., 2016). Evidence suggests that female athletes may be particularly vulnerable, with elite female soccer players exhibiting significant mental health symptoms, including eating disorders (36%) and moderate to severe depression and anxiety (11%) (Perry et al., 2022). Notably, 86% report having needed psychological support at some stage, yet access remains limited (Perry et al., 2022). Sport-related stressors, such as performance pressure and injury risk, may contribute to these challenges.

Stress is defined as an individual's perception that situational demands exceed their resources (Lazarus; Folkman, 1984). Not all forms of stress should be regarded as detrimental, as the experience of stress is inherently individual and may contribute to adaptive performance and positive well-being outcomes (Mansell, 2021). An emerging concept related to stress appraisal is stress mindset—an individual's belief that stress is either enhancing or debilitating (Crum et al., 2013). A 'stress-is-enhancing' mindset is associated with mental well-being (Mansell, 2021), proactive coping behaviours (Mansell; Turner, 2023) and enhanced physical performance (Smith et al., 2020). Conversely, a 'stress-is-debilitating' mindset correlates positively with threat appraisal tendencies and depressive symptoms (Mansell, 2021).

Research suggests that although stress mindset is a trait level belief it can be altered through education and psychological skills training, such as imagery (Crum et al., 2013). Furthermore, The Theory of Challenge and Threat States in Athletes (TCSTA; Jones et al., 2009) posits that stress appraisal influences outcomes where challenge occurs when perceived resources meet demands, whereas threats occur when demands surpass resources. The revised framework (TCTSA-R; Meijen et al., 2020) further emphasises the role of trait dispositions in shaping these appraisals, underscoring the need to examine how cognitive factors influence athlete wellbeing. Within environments such as high-performance sports teams, where stressors and demands are continually present, it is essential to work with athletes to enhance their beliefs about stress.

Irrational beliefs, central to Rational Emotive Behaviour Therapy (REBT; Ellis, 1994), may contribute to poor mental health in female athletes. These rigid, extreme cognitions include demandingness (e.g., "I must succeed"), awfulizing ("Failure is

catastrophic"), self-depreciation ("Failure defines me"), and low frustration tolerance ("I cannot endure setbacks") According to the GABC model put forth within REBT, goal-incongruent events (A) elicit emotional and behavioural consequences (C) through the influence of either rational or irrational beliefs (B). The expanded GABCDE model incorporates disputation (D) and the reinforcement of adaptive beliefs (E). The framework facilitates individuals in developing self-awareness regarding the role of their beliefs in contributing to maladaptive outcomes, thereby emphasising that they have control over their responses to adversity due to their autonomy over their beliefs (Turner, 2022).

A ‘stress-is-debilitating’ mindset may be considered analogous to irrational beliefs, as it is characterised by rigidity, illogical reasoning, and a lack of utility for well-being and performance (Mansell, 2021). Research suggests that irrational beliefs exacerbate maladaptive stress responses, whereas fostering rational beliefs enhances resilience and wellbeing (Turner, 2022). Evidence demonstrates that REBT-based interventions effectively reduce irrational beliefs, mitigate anxiety and facilitate adaptive stress appraisals (Mansell et al., 2023). Such interventions are inherently flexible due to the diverse range of approaches that the framework can support when working with athletes.

A fundamental principle of REBT is the education of individuals about the ABC thinking framework, particularly the crucial role beliefs play in shaping thoughts, emotions, and behaviours (Turner, 2022). In addition to education, reappraisal has been shown to be effective in altering the emotional impact of a perceived stressful situation (Mansell et al., 2023). Reappraisal aligns with the core tenets of REBT by not advocating for the avoidance of stressors but rather recognising their inevitability and facilitating the adoption of more adaptive ways of thinking about stress. One method of reappraisal is the use of imagery. Considered as a psychological skill in which an individual uses all available senses to experience an event (White; Hardy, 1998), imagery is a method that enables individuals to attach facilitative meanings to stress responses.

The ABC framework within REBT is conceptually linked to imagery (Turner, 2022) and may be complemented by self-compassion. Self-compassion, encompassing self-kindness, mindfulness, and common humanity (Neff, 2003), has been associated with improved psychological functioning in female athletes (Mosewich et al., 2013). Integrating stress mindset, REBT, imagery, and self-compassion within a

multimodal intervention may enhance athlete well-being and performance. Despite evidence supporting REBT and stress mindset interventions, no studies have specifically examined the effects of a multimodal intervention on individual irrational beliefs in female soccer players (Jordana et al., 2020). This study aims to assess a six-session cognitive-behavioural intervention targeting irrational beliefs, stress mindset, and perceived performance in female soccer players. It is hypothesised that the intervention will reduce irrational beliefs, enhance stress mindset, and improve perceived performance, with sustained effects at follow-up.

2 METHOD

2.1 Participants

Fourteen female soccer players (M_{age} = 22.79 years, SD_{age} = 4.64 years) participated in the study. All players competed in the Women's League of Ireland (WLOI), which is the highest level of female club soccer in Ireland. Prior to the initial data collection, ethical approval was obtained from the university's ethics committee. The participants were also provided with an information sheet outlining details of the study such as data confidentiality and inclusion/exclusion criteria. The participants were also made aware of their freedom to withdraw at any stage. All players signed a consent form prior to taking part in the study.

2.2 Design and Procedures

To examine the effectiveness of the intervention, a quasi-experimental design was used with data collected at pre-test (beginning of intervention; session one), post-test (immediately following the intervention) and follow up (two weeks following conclusion of intervention).The data collected allowed for comparison on each of the outcome variables across three time points. This intervention took place towards the end of the season typified by the latter stages of cup competitions and important league fixtures that may determine a team's final position. Data were gathered via questionnaires created through the use of Qualtrics software. Social validation was also used to compliment the quantitative data and further comprehend the intervention's effectiveness.

2.3 Intervention

Regarding the intervention, analyze Table 1 below:

Table 1 - Structure of the Multi-Modal Cognitive Behavioural Intervention (M:PUP)

Session Topic	Session Content	Theory	Example Activities
1. Stress mindset	Introduction of intervention (aims, practicalities). Explore understanding of stress. Introduction of stress-mindset	Stress Mindset (Crum et al., 2013)	Production of mind map of associated words with stress. Video: Rethinking stress.
2. Stress mindset, challenge and threat	Understand how to apply stress mindset theory. Introduction of seeing a stressful situation as a challenge or threat	The Theory of Challenge and Threat in Athletes-Revised (Meijen et al., 2020)	Control Map: Acknowledging what an individual can/cannot control
3. Irrational beliefs	Introduction of the ABC framework poised within REBT to help players think more adaptively prior to stressful situations	Rational Emotive Behaviour Therapy (REBT; Ellis; Dryden, 1997)	The 'Badness Scale' to dispute players' beliefs.
4. Self-compassion	Understand how players might think prior to a competitive match and which strategies' players can use to approach competition more helpfully	Self-compassion (self-kindness, common humanity, and mindfulness (Neff, 2003)	Be your own coach task to promote self-kindness.
5. Imagery	Introduction to imagery, practice imagery underpinned by the Bioinformational Theory of Imagery (Lang, 1979)	Enhancing stress mindset through imagery (Keech et al., 2021a)	Depiction of the importance of imagery. Co-write imagery script for future use
6. Recap of all topics	Recap and reflect on how athletes' thoughts and feelings about stressful situations may have changed over the course of the intervention	All the above	Athletes were provided with an overview of strategies they had learned on the intervention which was referred to as their toolkit

Source: prepared by the authors, 2025

The intervention was based on the work of Mansell et al. (2023). Entitled ‘Mindset: Performing Under Pressure’ (MPUP), the first session contained educative content on stress that aimed to enhance stress mindset, while the second focused on stress appraisals of challenge and threat. The third session featured education on the ABC framework posited within REBT, with session four focused on compassion and highlighted the importance of common humanity. The fifth session was devoted to effective use of imagery, whereas the final session was used to recap key learnings with the group. For a more in-depth breakdown of the materials covered please see Table 1.

2.4 Measures

2.4.1 Irrational Beliefs

Irrational beliefs were measured using the Irrational Beliefs Performance Inventory (IPBI; Turner et al., 2018). The 28-item scale was broken down into four subscales assessing each of the four irrational beliefs (Ellis, 1994); demandingness, awfulizing, low frustration tolerance, and self-depreciation. Responses were scored on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The Cronbach alphas coefficient showed largely high levels of reliability for each subscale (Demandingness; α = 0.72, Awfulizing; α = 0.73, Low frustration tolerance; α = 0.82, Depreciation; α = 0.86).

2.4.2 Stress Mindset

Stress mindset was assessed using the Stress Control Mindset Measure (SCMM; Keech et al., 2021). The SCMM is a 15-item scale scored on a 6-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree). In contrast to the original Stress Mindset Measure (Crum et al., 2013), the SCMM reflects malleability of stress responses (e.g., “stress can be used to.”, “stress will impair”). Cronbach’s alphas coefficient showed high levels of reliability (α = 0.96).

2.4.3 Perceived Performance

The players' perception of performance was measured across the three time points by asking "How well do you feel you are performing at this time". Taking into account the last two weeks, please rate from 0-100% how well you think are performing (0 = extremely poorly to 100 = extremely well)?". This approach is based on the assessment of performance in other previous studies (Mansell et al., 2023). A correlation analysis was used to assist test-retest reliability. Results indicated a significant positive relationship between performance at all time points. (Baseline to post intervention r = 0.729, p = .003; Baseline to follow up r = 0.738, p = .003; Post intervention to follow up r = 0.836, p = .001).

2.5 Social Validation

The experimental group (n = 14) completed a number of social validation questions following the completion of the intervention. The social validation section contained a combination of quantitative and qualitative elements based on previous research examining participants' experience of psychological interventions (Slater; Barker, 2019). Participants were asked to explain what they enjoyed about the intervention, what they would change about the intervention and what strategies they were using as a result of the intervention.

This section also contained quantitative questions related to the suitability of the intervention (e.g., "To what extent do you think that taking part in the project has enhanced your wellbeing?"). All questions within this section were scored using a 7-point Likert scale. Some questions were structured in such a way that 1 equated to the lowest score and 7 equated to the highest (e.g., "How likely would you be to recommend taking part in the sessions to a friend?"). Other questions were structured that 4 equated to the ideal score, whereas 1 and 7 were deemed the most negative scores in either direction (e.g., "How appropriate was the intervention in terms of the number of sessions?

2.6 Data analyses

Data were screened and cleaned using SPSS (IBM, Version 29), with the final dataset containing less than 5% missing data. Little's MCAR test confirmed that data were missing at random ($p > 0.05$), and the expectation maximisation method was applied to complete the dataset . Z-scores (-3 to +3) were used to identify outliers, which were subsequently adjusted using the Winsorising technique (e.g. Mansell et al., 2023). Normality was assessed through visual inspection of histograms and Shapiro-Wilk tests ($\alpha = 0.05$).

A repeated-measures ANOVA was conducted to examine differences across three time points (baseline, post-intervention, and two-week follow-up) in the four irrational belief subscales, stress mindset, and perceived performance. Significant pairwise differences were identified using Bonferroni-adjusted comparisons. Partial eta-squared (η^2_p) was used to determine effect sizes, classified as small ($.01 \geq \eta^2_p < 0.06$), medium ($.06 \geq \eta^2_p < .14$), or large ($\eta^2_p \geq .14$) (Cohen, 1988). As perceived performance data were not normally distributed, a Friedman test was conducted.

3 RESULTS

3.1 Manipulation Checks

Quantitative data suggests the athletes were engaged with the imagery content throughout the intervention ($M = 5.20$, $SD = 1.15$). This is echoed by some qualitative findings, "*I found it easy to concentrate because it was interesting*".

3.2 Stress Mindset

The means and standard deviations for each variable are displayed in Table 2. A repeated measures ANOVA determined that stress mindset had differed significantly between time points $F(2,26) = 24.19$, $p < .01$, $\eta_p^2 = 0.65$. Subsequent Post Hoc analysis using a Bonferroni test revealed that stress mindset had significantly increased from baseline to post-intervention (1.19 (95% CI 1.87, 0.54), $p < .01$) and from baseline to two-week follow-up (1.07 (95% CI 1.65, 0.5), $p < .01$). There was no significant

difference in stress mindset within the group between post-intervention and follow-up (0.12 (95% CI -0.35, 0.59), *p* >.05).

Table 2 - Means/totals and standard deviations of stress mindset, demandingness, low frustration tolerance, awfulizing, self-depreciation and perceived performance at baseline, post-intervention and follow-up.

	Baseline		Post Intervention			Follow Up		
	Mean/Total	SD	Mean/Total	SD	Effect Size	Mean/Total	*SD*	Effect Size
Stress Mindset [a, b**]	3.2	0.89	4.39	0.86	1.34	4.27	0.87	1.2
Demandingness [b**]	27.86	3.2	25.64	2.9	-0.69	25.5	3.25	-0.74
Low Frustration Tolerance [a, b***]	30.29	4.39	25.57	2.77	-1.08	24.64	4.57	-1.29
Awfulizing [ab*]	26.21	3.47	23.57	3.44	-0.76	22	3.33	-1.21
Self-depreciation [a*]	20.14	3.32	16.21	4.63	-1.18	17.94	5.09	-0.66
Perceived Performance	62.45	22.06	63.09	23.47	0.02	70.09	6.88	0.34

Description:

[a] = Significant difference between baseline and post intervention

[b] = Significant difference between baseline and follow up

* = p < 0.05, ** = p < 0.01, *** = *p* < 0.001

Source: prepared by the authors, 2025

3.3 Demandingness

A repeated measures ANOVA determined that demandingness had differed statistically significant between time points F (2,24) = 8.80, $p < .01$, $\eta_p^2 = 0.42$. A Post Hoc analysis using a Bonferroni test revealed no significant difference between demandingness from baseline to post intervention (2.54 (95% CI -0.618 5.96), $p > .05$) and from post intervention to two-week follow-up (1.69 (95% CI -1.8 3.57), $p > .05$). However, there was a significant decrease in demandingness from baseline to follow-up (4.23 (95% CI 1.00 7.46), $p = .01$).

3.4 Awfulizing

A repeated measures ANOVA determined that awfulizing had differed statistically significant between time points F (2,24) = 4.05, $p < 0.05$, $\eta_p^2 = 0.25$. Subsequent Post Hoc analysis using a Bonferroni test revealed a significant decrease in awfulizing from baseline to post intervention (2.15 (95% CI -0.55 4.86) $p = .02$) and from baseline to two-week follow-up (-4.21 (95% CI 0.87 to 7.56) $p = .01$). There was no significant difference from post intervention to follow up.

3.5 Self-Depreciation

A repeated measures ANOVA determined that self-depreciation had differed statistically significant between time points F (2,26) = 5.22, $p < .05$, $\eta_p^2 = 0.29$. Subsequent Post Hoc analysis using a Bonferroni test revealed a significant decrease in self-depreciation from baseline to post intervention (-3.93 (95% CI 0.55 to 7.30), $p = .03$). There was no significant difference from post intervention to follow-up or from baseline to follow-up.

3.6 Low Frustration Tolerance

A repeated measures ANOVA determined that low frustration tolerance had differed statistically significant between time points F (2,26) = 11.095, $p < .001$, $\eta_p^2 = 0.46$. Subsequent Post Hoc analysis using a Bonferroni test revealed a significant

decrease in low frustration tolerance from baseline to post intervention (-4.71 (95% CI -0.82 to 8.60), *p* = .02) and from baseline to two-week follow-up (-5.64 (95% CI 1.74 to 9.54), *p* = .05). There was no significant difference from post intervention to follow up.

3.7 Perceived Performance

A Friedman test was carried out as the data failed the test of normality. The Freidman test revealed there was no significant difference in perceived performance across the three time points $\chi 2$ (2, N = 11) = 3.35, *p* >0.05.

3.8 Social Validation

Social validation data indicated that participants perceived improvements in wellbeing (*M* = 5.6, *SD* = 1.24) and performance (*M* = 5.33, *SD* = 1.40) following the intervention. Strong evidence suggests they found the intervention both enjoyable and useful, with a high likelihood of recommending it to a friend (*M* = 5.93, *SD* = .80). Qualitative data supported these findings, highlighting key intervention components that resonated with athletes. Stress mindset was particularly well received, with eight of fourteen participants referencing their enhanced understanding.

One athlete noted, *"I got to look at a good side of stress and learned how to take stress to succeed in my performance."* Others valued learning to *"turn stress into a positive"*. Self-compassion and self-kindness were also appreciated, with one athlete highlighting the benefit of "*talking to yourself as a friend would*". Imagery techniques were frequently mentioned as enjoyable, particularly visualising performance in advance: "I liked how I was taught to visualise my performance a day/night before to be prepared for what could happen." Group work and discussions were also well received, referenced by five participants, likely due to their familiarity with one another. Finally, session and intervention length were generally deemed appropriate (*M* = 4.93, *SD* = 1.1; *M* = 4.67, *SD* = 1.54, respectively).

4 DISCUSSION

This study examined the impact of a multimodal cognitive-behavioural intervention on stress mindset, irrational beliefs, and perceived performance in female

soccer players. As hypothesised, the intervention significantly reduced self-depreciation, awfulising, and low frustration tolerance while increasing stress mindset. These changes were maintained at follow-up, reinforcing the intervention's efficacy (Nejati et al., 2022). However, demandingness did not significantly decrease immediately post-intervention, and perceived performance did not improve, suggesting further refinement may be required.

Findings align with prior research supporting the use of REBT-based interventions to reduce irrational beliefs in team sport settings (Nejati et al., 2022). Notably, this is the first study to simultaneously reduce irrational beliefs and enhance stress mindset in an female team sport context, addressing the underrepresentation of female athletes in psychological research (Jordana et al., 2020).

A novel aspect of this study was the individual analysis of irrational belief subscales, offering insights into intervention mechanisms. The significant reduction in self-depreciation may be linked to the session on self-kindness and common humanity (Mosewich et al., 2013), where athletes learned to extend compassionate self-talk. Similarly, reductions in awfulising may have resulted from cognitive restructuring exercises, such as the "badness scale" (Mansell et al., 2023), which helped contextualise stressors.

The badness scale helps the athletes twofold. First, it helps the athlete understand that branding setbacks in sport as “awful” is in fact illogical. Secondly, through the visual aid of the scale, it demonstrates that although things may seem very bad, they are not “awful”. In terms of performance, awfulizing is shown to have a positive association with threat appraisal tendencies (Mansell, 2021). With previous research highlighting the direct relationship between awfulizing and athlete wellbeing, it would be advantageous to implement an intervention such as the one used in the present study to reduce this irrational belief.

Low frustration tolerance also significantly decreased, supporting previous findings that this belief negatively influences threat appraisals and performance (Mansell, 2021). Additionally, the ABC framework (Ellis, 1994) may have facilitated cognitive restructuring, encouraging athletes to challenge irrational beliefs. Contrary to the hypothesis, demandingness did not significantly decrease post-intervention, though a delayed reduction was observed at follow-up. This challenges the REBT-I model's assertion that secondary irrational beliefs stem from demandingness (Mansell; Turner, 2022), suggesting that these beliefs may operate independently. Resistance

to modifying demandingness may stem from its perceived motivational function in elite sport (Turner, 2022). Future interventions may require stronger disputation techniques to address this belief effectively.

Perceived performance did not significantly improve, in contrast to previous research (Nejati et al., 2022). The subjective nature of performance assessment may account for this, as athletes' perceptions can be influenced by isolated game events. Objective performance measures, such as GPS tracking (e.g., total distance covered, sprint count), may provide more reliable assessments in future studies. Nonetheless, indirect performance benefits may emerge over time, given the positive relationship between stress mindset and challenge appraisals (Mansell, 2021).

In line with the hypothesis, stress mindset significantly increased post-intervention and was maintained at follow-up. These findings support previous research demonstrating that stress mindset is malleable and can be modified through short interventions (Crum et al., 2013; Keech et al., 2021). The educational content, particularly multimedia materials promoting the adaptive aspects of stress, likely contributed to this change (Crum et al., 2013). A "stress is enhancing" mindset is associated with improved cognitive function, challenge appraisals, and proactive coping (e.g. Mansell; Turner, 2023), making it a valuable psychological asset for athletes.

4.1 Strengths and Limitations

This study's primary limitation was the absence of a control group. Although a control group was initially planned, participant withdrawals precluded its inclusion. Future research should employ randomised controlled trials and crossover designs to strengthen causal claims. The small sample size is another limitation, warranting replication with a larger cohort. However, a key strength was the ecological validity of data collection across multiple time points, capturing real-world intervention effects.

4.2 Applied Recommendations

Findings have several practical implications. Athletes should be encouraged to adopt a "stress is enhancing" mindset through education and cognitive restructuring, as this belief is linked to improved performance and wellbeing. Practitioners should

integrate self-compassion strategies, particularly in high-pressure contexts, and promote imagery techniques to facilitate more adaptive stress responses. Disputing irrational beliefs over time should be a core focus, with structured cognitive disputation exercises to challenge well established beliefs.

5 CONCLUSION

This study provides initial evidence that a six-week REBT-based intervention can concurrently reduce irrational beliefs and enhance stress mindset in female soccer players. Findings suggest that a stress-is-debilitating mindset shares characteristics with irrational beliefs, as both are rigid and maladaptive. Furthermore, the study underscores the efficacy of integrating stress mindset education with practical techniques such as imagery and self-compassion to facilitate psychological change. Given the sustained effects observed at follow-up, this intervention model holds promise for wider application in women's sport.

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