



Exploring the Association Between Irrational Beliefs, Motivation Regulation and Anxiety in Ultra-Marathon Runners: A Mixed Methods Approach

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Accepted: 1 June 2022 / Published online: 25 July 2022
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Abstract

Researchers are beginning to explore the antecedents to anxiety symptomology. Such antecedents to anxiety symptomology may be that of irrational beliefs and motivation regulation. It has been intimated that both irrational beliefs and motivation regulation can be risk factors for increased anxiety in athletes. Research is yet to explore the association between these two antecedents, and how and whether they interact in predicting anxiety symptomology. The present paper investigates such associations within two phases. In phase one, we identify the predictive capacity of irrational beliefs and motivation regulation on anxiety symptomology in 61 elite ultra-marathon runners. Results support intimated associations between irrational beliefs and motivation regulation, evidencing that irrational performance beliefs negatively associated with relative autonomous motivation. In addition, it was found that irrational performance beliefs positively associated with anxiety symptomology, whilst autonomous motivation negatively associated with anxiety symptomology in elite ultra-marathon runners. In phase two, we use a narrative approach to understand seven elite athletes' stories surrounding their performance beliefs, motivation, and anxiety symptomology. Phase two supports findings in phase one, evidencing that the co-existence of both irrational performance beliefs and controlled motivation is an antecedent to anxiety symptomology and dysfunctional behaviours in ultra-marathon runners. The findings of both phase one and phase two are discussed in relation to the theoretical and practical implications for elite athletes.

Keywords Ultra-marathon · Elite · Motivation · Irrational beliefs · Anxiety

An ultra-marathon can be an all-consuming event for athletes, leaving minimal time for leisure after training. Whilst it is evident that completion of such a feat is certainly appealing to many, the brutal nature of training loads, injury troubles,

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competitive pressure and pain of defeat is endemic (Nixdorf et al., 2016). Whilst the nature of this training can be ruthless, popularity of these events has grown exponentially, with a 1696% increase in participation over the last 25 years (Distance Plus, 2020). Often, the training regimes of elite long-distance athletes can induce mood disturbances (Eichner, 1995), which may play a part in maladaptive sleep quality and vitality of athletes of this nature (Davis & Turner, 2019). To this end, it is advantageous to understand whether healthier, functional beliefs and motives for participation is conducive to lower psychological dismay, and successful athletic careers. There has been a documented disparity in overload, exhaustion and psychological distress between amateur and elite distance athletes (Turner et al., 2019b). As such, it may be that the beliefs and motives elite athletes have may help maintain well-being and continue without burnout or drop-out (see Weiss & Ambrose, 2008, for a review). At the center of this paper is to identify whether (dis)functional beliefs and motives contribute towards (mal)adaptive psychological states in elite ultra-marathon runners. Specifically, the underlying framework in understanding beliefs is rational emotive behavior therapy (REBT; Ellis, 1995). REBT has been shown to be effective in challenging beliefs athletes hold, contributing to reductions in anxiety (e.g., Turner & Barker, 2013), as well as increases in self-efficacy (Chrysidis et al., 2020), resilience (Deen et al., 2017), and performance (Wood and Turner 2019).

Central to REBT is the notion that emotional and behavioural functionality is influenced by irrational and rational beliefs. The theory is guided by the ABC cognitive framework (Dryden & Branch, 2008), in which beliefs (B) about adversity (A) influence emotional and behavioral responses (C). Specifically, an individual's ability to respond adaptively to adversity (i.e., a long-distance event) is largely dependent on (ir)rational beliefs. There are four irrational beliefs, including demandingness (i.e., PIB; 'I want to and therefore I must perform well'), awfulizing (i.e., AWF; 'It's terrible if I don't perform well'), frustration intolerance (i.e., LFT; 'I can't stand it I don't perform well') and depreciation (i.e., DEP; 'I'm worthless if I don't perform well'). Irrational beliefs are rigid, extreme, and illogical. Conversely, rational beliefs include preference (i.e., 'I want to perform well, but that doesn't mean that I have to'), anti-awfulizing (i.e., 'it might be bad, but it is not terrible if I don't perform well'), frustration tolerance (i.e., 'it is tough, but I can stand it if I don't perform well') and unconditional acceptance (i.e., 'not performing well does not mean I am worthless, it simply shows that I am fallible human being'). Rational beliefs are flexible, non-extreme, and logical. Rational beliefs are proposed to lead to functional-negative emotions (i.e., sadness) and adaptive behavioral responses such as reaching out to others (Dryden & Branch, 2008), whilst irrational beliefs have been found to associate with trait anxiety and trait anger (Turner et al., 2019a, 2019b), competitive anxiety (Chadha et al., 2019) and poorer performance under pressure (Mesagno et al., 2020).

Within a similar demographic Davis and Turner (2019) evidenced that REBT improved irrational beliefs in triathlon athletes. In addition, the authors also evidenced a marked improvement in self-determined motivation. As a result of improvement in beliefs about sporting behaviour, the reasons for said behaviour improved in tandem. Within self-determination meta-theory (SDT; Deci & Ryan,

1985), the organismic integration theory (OIT; Ryan & Deci, 2000) categorizes motivation across a continuum of six regulation types; intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation. Of these six, three are considered autonomous (i.e., driven by internal rewards; intrinsic, integrated, and identified regulations), whilst two are considered controlled forms of motivation (i.e., driven by external rewards; introjected and external regulation; Howard et al., 2020a, 2020b). The last regulation, amotivation, is the complete lack of intention to enact a behaviour (Ryan & Deci, 2000). Autonomous motives are considered to be adaptive states, positively contributing to learning, performance, and persistence (Vansteenkiste et al., 2004) and greater health (Ng et al., 2012). Conversely, controlled motivation has been found to be associated with maladaptive outcomes such as poor sleep quality, anxiety, and depression (Sheehan et al., 2018). The first formal bridging of the two concepts mentioned (REBT and OIT) came from Turner (2016), postulating that irrational beliefs and motivation regulation types (as per OIT) should be considered together in order to adequately understand athlete mental health. Since this proposition, intervention studies have demonstrated that REBT has been effective in reducing irrational beliefs, and thus increasing autonomous motivation in triathletes (Davis & Turner, 2019; Turner and Davis 2019), American football athletes (Chrysidis et al., 2020), and an archer (Wood and Turner 2019). As such, this increase in autonomous motivation, as a result of reductions in irrational beliefs, illuminates a clear association between these two constructs that warrant further exploration.

This exploration of the association between irrational beliefs and motivation regulation is necessary with a greater number of participants. Existing interventions that link the two constructs within athletic populations have used single case designs, limiting breadth of respondents. Gathering data on the association between these constructs, within a similar demographic that these constructs have been associated (i.e., Davis & Turner, 2019), will provide an understanding of the connection between these constructs. In addition, by interviewing elite ultra-marathon runners, verbal iterations of any discernable links between the two constructs can be formulated.

In addition, previous research within athletic populations has evidenced associations between irrational beliefs and trait anxiety (Turner et al., 2019a, 2019b) and competitive anxiety (Chadha et al., 2019). Equally, controlled motivation has also been found to associate with anxiety (Sheehan et al., 2018). This is unsurprising, as both irrational beliefs and controlled motivation reflect contingent self-worth (Ellis, 1957; Lonsdale & Hodge, 2011), putting an athlete in an unstable position (i.e., mental health; Turner et al., 2022). Here, the belief about participation in competition is because they ‘must’ do so, and do so in order to avoid guilt and self-deprecating beliefs. In turn, these contingent beliefs will only increase competitive anxiety responses (i.e., Chadha et al., 2019). Adding the endemic nature of high training loads, injury fears and competitive pressure (Nixdorf et al., 2016) that comes with ultra-marathon training, it is difficult to envision an athlete who competes in order alleviate guilt and self-deprecating beliefs to not suffer with competition related cognitive and somatic anxiety responses. As such, understanding the tripartite of relationships between irrational beliefs, motivation regulation and anxiety within an

elite sports setting will calve the path for the formulation of future interventions. Phase 1 of the present study aims to understand the associations between the three constructs (irrational beliefs, motivation regulation and competitive anxiety), whilst phase 2 aims to provide verbal representations of whether these constructs may or may not be associated, and why this is the case.

Phase 1

Theoretically, irrational beliefs associate with controlled motivation regulations, whilst rational beliefs associate with autonomous motivation regulations. By this, intervention research has evidenced concomitant improvements in autonomous motivation as a result of decreased irrational beliefs (i.e., Davis & Turner, 2019; Wood et al., 2020). In addition, irrational beliefs, as well as controlled motivation regulations have been found to associate with anxiety related variables (Chadha et al., 2019; Turner et al., 2019a, 2019b; Sheehan et al., 2018). The present research aims elucidate the relationship between the three constructs in an elite athletic setting.

Methods

Participants and Design

Following institutional ethical approval, convenience and snowball sampling took place, contacting individuals via emails, word of mouth, and social media. Convenience sampling was achieved by liaising with elite ultra-marathon runners. Snowball sampling was achieved by encouraging athletes on completion to send details of the study to other potential athletes that may be interested. A total of 61 (39 males) elite ultra-marathon athletes took part in the study. Once ethically approved, a Qualtrics survey was sent to the individuals. All surveys were completed on the participants' electronic device.

Phase 1 was an atemporal cross-sectional design, employed to investigate the associations between irrational beliefs, motivation regulation and competitive anxiety. On the survey participants were asked if they wished to leave their contact details (i.e., email address). This was done to identify who was willing to take part in a follow up interview.

Measures

Irrational Beliefs The Irrational Performance Beliefs Inventory II (iPBI-II; Turner & Allen, 2018) is a 20-item questionnaire that measures irrational beliefs within performance settings. Responses are made on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). This form has evidenced good criterion, construct, concurrent reliability (Turner 2016), and factor structure (Turner & Allen, 2018). Cronbach's α for the present study demonstrated good to excellent internal consistency (PIB=0.72,

LFT=0.85, AWF=0.84, DEP=0.77). Replicating previous research (Turner et al., 2018), the four subscales were summed and averaged to form a composite irrational beliefs variable.

Motivation The Sport Motivation Scale-II (SMS-II; Pelletier et al., 2013) assesses amotivation ($\alpha=0.77$), external regulation ($\alpha=0.71$), introjected regulation ($\alpha=0.64$), identified regulation ($\alpha=0.74$), integrated regulation ($\alpha=0.66$), and intrinsic motivation ($\alpha=0.86$). Cronbach's α for introjected and integrated regulation were questionable. Each of the 18-items is rated on a 7-point Likert-scale ranging from 1 (*not true at all*) to 7 (*very true*). Subscales of the SMS-II were integrated into a single index known as the Relative Autonomy Index (RAI; Connell & Ryan, 1985; Grolnick & Ryan, 1987). The RAI has been widely applied with different contextual measures of the self-determination continuum and is calculated by weighting each subscale and summing the weighted scores such that the final index represents the overall degree of relative autonomy in the regulation of a behaviour (Markland & Ingledew, 2007).

Anxiety The Sport Anxiety Scale II (SAS-II) is a measure of cognitive, somatic and behavioural anxiety (i.e., concentration disruption). Containing 5-items for each subscale, responses are made on a 4-point Likert scale. Athletes were asked to rate how many of the items applied to them, from 1 (*not at all*) to 4 (*very much*). SAS-II has evidenced factorial and construct validity (Smith et al., 2006). Cronbach's α for the present study demonstrated good internal consistency (Cognitive $\alpha=0.86$; Somatic $\alpha=0.84$; Concentration Disruption $\alpha=0.84$).

Data Analysis

We planned four phases of data analyses for Phase 1. First, descriptive statistics and an intercorrelation matrix was calculated. Second, an intercorrelation matrix (see Table 1) identified that intercorrelations between predictor variables were below the 0.80 cut-off (Berry & Feldman, 1985). Third, we conducted a multiple regression and a hierarchical multiple regression. A multiple regression assessed the associations between composite irrational beliefs and relative autonomy. The hierarchical regression assessed the associations between sex and age (Step 1), composite irrational beliefs (Step 2), relative autonomy (Step 3), and composite anxiety. Analysis revealed no missing data. Data-points with z scores greater than two were Winsorized (Smith, 2011). This is a process in which extreme values are replaced to reduce the influence of outliers on the data. Overall, 0.03% of data were Winsorized. For regression analyses, the multicollinearity assumption was met, and Cook's distance values were less than 1. Variance inflation factor values (≤ 1.44) and tolerance values (≥ 0.70) were acceptable (Hair et al., 1995). The independent errors assumption was satisfied, with Durbin-Watson values being between 1 and 3 (Field, 2017).

Table 1 Means, standard deviations and inter-correlations between main study variables

	Mean \pm SD	1	2	3	4	5	6	7	8	9	10
1. Irrational Beliefs	12.04 \pm 2.16	–									
2. Intrinsic	17.85 \pm 2.52	–.06	–								
3. Integrated	11.22 \pm 1.29	.08	.07	–							
4. Identified	5.91 \pm 1.04	–.14	.67*	.17	–						
5. Introjected	4.34 \pm 1.18	.47*	.11	.12	.17	–					
6. External	3.87 \pm 2.07	.47*	–.01	.24	–.11	.48*	–				
7. Amotivation	5.75 \pm 3.10	.49*	–.01	.26**	–.10	.39*	.69*	–			
8. Cognitive Anxiety	3.80 \pm 1.38	.52*	–.15	.08	–.28**	.43*	.42*	.55*	–		
9. Somatic Anxiety	3.60 \pm 1.20	.43*	–.13	.01	–.19	.44*	.44*	.43*	.69*	–	
10. Concentration Disruption	2.70 \pm .95	.25	–.001	.02	–.11	.22	.41*	.55*	.54*	.59*	–

** $p \leq .05$; * $p \leq .01$

Results

Relative Autonomy

Sex (0=Male, 1=Female), age and irrational beliefs were included in a multiple regression. Analyses indicated a significant negative association between age ($b = -7.90$, CIs: $-15.00, -0.78$) and relative autonomy. The results indicated a non-significant positive association between sex and relative autonomy, $b = 4.08$, CIs: $-5.45, 13.61$. Irrational Beliefs negatively associated with relative autonomy, $b = -15.42$, CIs: $-23.93, -6.91$, $R^2_{\text{Model}} = 0.26$. In sum, sex, age and irrational beliefs explained 26% variance in athletes' reported relative autonomy.

Anxiety

Sex (0=Male, 1=Female) and Age was added in Step 1. Analyses indicated non-significant associations between both: (1) sex ($b = -0.79$, CIs: $-2.44, 0.86$); and (2) age ($b = -0.55$, CIs: $-1.79, 0.70$) and composite anxiety, $R^2_{\text{Model}} = 0.03$. At Step 2, the results indicated a significant positive association between irrational beliefs and composite anxiety, $b = 0.66$, CIs $0.33, 1.00$, $R^2_{\text{Model}} = 0.24$. At Step 3, the results indicated a significant negative association between relative autonomy and composite anxiety, $b = -0.26$, CIs $-0.38, -0.15$, $R^2_{\text{Model}} = 0.44$. In sum, sex, age, irrational beliefs and relative autonomy explained 44% variance in athletes reported composite anxiety.

Discussion

Results from Phase 1 identified that irrational performance beliefs negatively associated with relative autonomy. In addition, findings identified that irrational beliefs positively associated with composite anxiety, and relative autonomy negatively associated with composite anxiety. Specifically, high irrational beliefs and high amotivation and controlled motivation is likely to be associated with greater anxiety symptomology than athletes who reported low irrational beliefs, and autonomous motivation. Based on these results, it is clear that irrational beliefs and maladaptive motivation regulation is conducive to greater anxiety symptomology in this sample.

Phase 2

Phase one evidenced the associations between irrational beliefs, motivation regulation and anxiety symptomology held by ultra-marathon athletes. Although we find statistical associations, to fully understand the association between these variables, we must gain insight into athletes' stories surrounding these concepts. Given the existing examinations of irrational beliefs, motivation, and anxiety within previous research (Chadha et al., 2019; Mesagno et al., 2020; Sheehan et al., 2018; Turner

& Barker, 2013; Turner et al., 2019a, 2019b), a thematic approach is necessary to understand athletes' stories. Understanding individuals' beliefs and motives on both a statistical and verbal level provides greater detail, being a common design in sport and exercise research (McLoughlin et al., 2021; Sturm et al., 2021).

Methods

Participants and Design

Seven elite ultra-marathon runners were interviewed after completing the questionnaires in Phase 1. Four of the ultra-marathon runners reported high irrational beliefs ($M=18.75$, $SD=0.89$, $Range=1.75$) whilst three of the runners reported low irrational beliefs ($M=9.67$, $SD=2.27$, $Range=4.50$). Results are split into those who scored high, and those who score low on the IPBI (relative to the average IPBI scores reported; $M=12.04$). Similar techniques have been used to split data based on preliminary criteria (e.g., Saint-Martin et al., 2020), allowing for investigation into motives and anxiety responses between these created groups. The athletes were asked to leave their email address at the end of the questionnaires if they wished to be contacted regarding their responses. Incorporating inductive and deductive elements, a narrative approach was taken (Smith & Sparkes, 2016). A narrative approach, being common in REBT research (Darpatova-Hruzewicz, 2022), allows for the generation of novel accounts that relate to previous irrational beliefs literature (i.e., inductive), whilst detailing patterns in the data that relate specifically to the triadic relationship between irrational beliefs, motivation regulation and perceptions of anxiety (i.e., deductive). First, the first and second author immersed themselves in the transcripts, highlighting initial reflections on the data. This was done to facilitate initial refinement of the stories presented. Next, through the lens of beliefs, functionality of beliefs, motivation and anxiety, codes were interpreted into lower-order themes using a thematic map (Smith & Sparkes, 2016).

Results

Highest Irrational Beliefs

All athletes within this section reported greater irrational beliefs than average for the cohort. A narrative around the elevation of controlled motivation and anxiety responses came through in the interviews with these individuals. It was stated that:

“[I] will do anything to reach that goal [ultra-marathon completion]... I fell [injured themselves] but I was like you know what, no. I had a few painkillers, and I know you're not supposed to take them but.. I am going to do what I've got to do and I'll let the sweeper bus get me if that's what happens... if my peers thought that I was not worthy that would bug me terribly”

“I think sometimes we put our self-worth on achievements. And you don’t achieve them, you don’t feel like you’re worth anything... if you’re putting in a lot of effort, it’s kind of like, well what’s the point if you’re not getting any better at it.”

Here the athlete intimates a need to complete the ultra-marathon, and denies logical reasoning with regards to their own physical health, and the need for approval from peers. What we see here is that the athlete is not likely to state that ‘*I want to therefore I must compete*’, but rather states that they will do anything to complete the ultra-marathon. We can infer the rigid demand the athlete has placed on themselves, and indeed, athletes are unlikely to communicate perfectly formed irrational statements in brief interactions. Though what is of particular interest here is the functionality of this athlete’s behaviour. This athlete is willing to continue competing when injured, risking additional injuries. This dysfunctional behaviour is likely to, ironically, cause further injury, and reduce their ability to compete in the long term. In addition, the athlete is self-depreciative, seeing their entire being as ‘unworthy’ if a behaviour or action is not enacted as personally expected (e.g., an ultra-marathon; MacInnes, 2004). Self-depreciation beliefs have been associated with greater self-doubt (Balkis & Duru, 2018) and lower self-esteem (Chamberlain & Haaga, 2001). With respect to the functionality of the athletes’ behaviour, as a result of this depreciation belief, they question why they are continuing (i.e., amotivation), increasing likelihood of withdrawal, being dysfunctional in nature. Adding to this, the athletes also state:

“With an injury at the time, you know my peers wouldn’t look at me badly, but maybe if I walked off and said, look you know, I’ve got an injury, but then I’m not going to finish it, then people would have judged me differently. So maybe that was driving me... was I doing this [competing] for myself, or was I doing this because of what people would think of me? I think there’s a bit of both”

Continuing to compete with an injury seemed to have been a result of both inferred irrational beliefs and a fear of being judged unfavorably. According to OIT (Ryan & Deci, 2000), external motivation regulation is the enacting of behaviour to avoid punishment (i.e., ridicule), or gain a reward (i.e., a medal). This motivation regulation is being displayed in this case, adding to the inference that when irrational beliefs are held alongside a need to be viewed favorably, dysfunctional behaviours are likely. External motivation has been found to lead to poor sleep quality, anxiety, and depression (Sheehan et al., 2018). However, this isn’t to say that there is an absence of autonomous motivation. The athlete also evidences some autonomous motivation (i.e., “[competing] for myself”; Identified regulation). It seems that, based on the current findings, it is the presence of both irrational beliefs and controlled motivation, regardless of autonomous motivation, that may lead to anxiety symptomology. This is reinforced in the athletes’ interview, stating:

“I do get really nervous, so, I kind of feel a bit more heavy and you know jittery. Not really pumped.”

“I started getting doubts, not about not finishing it [the ultra-marathon], but I hadn’t met my goal at 60km in... I’ve always been a bit dogged mentally... I don’t want to fail because so many people know I’m doing [the ultra-marathon]... I did consciously think about having to, you know, focus”

This particular athlete has evidenced clear controlled motivation regulation (alongside reported irrational beliefs). In turn, it seems that cognitive anxiety, somatic anxiety and concentration disruption occurred as a result. The worry about disappointing peers reflects external motivation regulation. Because motivation to compete is externally regulated, rumination is likely to occur, lending itself to irrational beliefs about the behaviour (“if my peers thought that I was not worthy that would bug me terribly”). Also, it seems that the athlete made a conscious effort to “focus”. As an elite athlete, the skill afoot should occur non-consciously. The presence of anxiety can increase likelihood of conscious awareness of self, inducing the conscious need to refocus. In doing this, performance is likely to suffer (i.e., the conscious processing hypothesis; Mullen et al., 2005) as automaticity of movements breakdown.

Overall, it has been evidenced that heightened irrational beliefs, alongside controlled motivation is conducive to dysfunctional behaviours (i.e., withdrawal from sport, persistence when injured) as well as elevated cognitive anxiety, somatic anxiety and concentration disruption. Namely, it seems that irrational beliefs alongside fear of dismissal from peers is a springboard for anxiety symptomology and dysfunctional behaviours. Conversely, the below evidences extracts from individuals who report lower irrational beliefs.

Lowest Irrational Beliefs

All athletes within this section reported lower irrational beliefs than average for the cohort. A narrative came from the data of which asserted the rational nature of competing, which was dually associated with greater intrinsic reverberation and lessened need for anxiety responses to competitive events. For example, participants challenged the emphasis on the need to complete the event, stating:

“Whether I’d finish or not, it’s really not a big thing if I don’t finish you know?... I did tell myself even going in, if I’m injured or something then obviously I’ll quit. If I’d experienced a slight fever or flu going into the race, I would have pulled out. So when it comes to running, I am quite rational about it”

“I think it [not completing the marathon] would be difficult to swallow, but at the end of the day you have to come to terms with it because you can’t change what has happened, you can only go and learn from it...”

What is of interest here, which opposes what was evident in those reporting high irrational beliefs, is the functionality of behaviour. This athlete accepts that if injured or sick, then they cannot perform efficiently, and will pull out of the competition. Here, the athlete is looking after their long-term health, and maximizing chances of competing long term. In addition, the athlete also states that if they do not finish, then it is an opportunity to learn. Instead of withdrawing from

the sport itself, the athlete is learning from what has happened, and using that for the next event. A potential reason for this functional behaviour may be the combination of both rational beliefs, and autonomous motivation:

“I’d rather run it, and you know, enjoy it, [as opposed to running to beat others], and then afterwards celebrate my success with them [family, competitors]... I eat like a runner, I sleep like a runner, I mean it’s my life... I’m not worried about the money that you win, it’s just for me, it’s a new experience, a new growth... I love it you know... if I couldn’t run forever... I would initially be sad, but, you know, it’s one of those things”

In relation to OIT (Ryan & Deci, 2000), the athlete goes onto evidence their intrinsic motivation, their love for the event, and going out there to enjoy it. The athlete also evidences integrated regulation, stating that running is part of who they are, internalizing the behaviour (“I eat like a runner, I sleep like a runner, I mean it’s my life”). Whilst the athlete shows autonomous motivation, there seems to be limited controlled motivation, stating that “it’s not about the money”, the potential reward that completion of the event may bring (i.e., external regulation). Research would suggest that autonomous motivation positively contributes to persistence (Vansteenkiste et al., 2004) and greater health (Ng et al., 2012). As such, with this tip towards autonomous regulation, and evidence from Phase 1, it would be expected that the dyadic association between low irrational beliefs, and low controlled motivation will be conducive to lower anxiety symptomology. However, it worth noting that internalizing the behaviour (i.e., I am a runner, its who I am) may act as a springboard for maladaptive health outcomes if coupled with depreciation beliefs. If an athlete internalizes the behaviour as who they are (i.e., being a runner is their entire being), this can put the athlete in a precarious position if they do not enact the behaviours that they wish to (i.e., a ‘runner’ not being able to run; Wood & Turner, 2019). This lack of ability to run (say through injury) can be an antecedent for self-depreciative beliefs (i.e., seeing their entire being as ‘unworthy’) because the individual is not enacting who they are (i.e., they are not running). In this iteration, it seems that motivation is adaptive because of the absence of irrational beliefs. However, as can be seen through the extracts above, and internalizing the behaviour as part of the self, the line between adaptive and maladaptive beliefs and motives may be small. Though taken together with other autonomous motives (e.g., intrinsic), alongside a lack of controlled regulation and irrational beliefs, the athlete is less likely to report anxiety symptomology. This expectation is reinforced, with the athletes stating:

“Running’s actually calmed me down quite a lot... The first thing I do is reach for my running shoes and I go for a run, and whether its fast or slow, it doesn’t bother me. I always come back feeling better”

Rather than competition becoming a stressor for athletes, which evidence would suggest tends to be the case because of its personal relevance and demanding nature (e.g., Meijen et al, 2020), the athlete sees running as an opportunity to “calm down”. Based on literary discussion, it would make sense that autonomous

motivation would likely lead to lesser anxiety responses. When motivation for a particular behaviour is self-directed, for “the love of it”, and uninfluenced by others, self-imposed pressure to “win” or “do well” is less likely to occur. Those who are intrinsically motivated are less likely to burnout (Cresswell & Eklund, 2005), are more likely to persist (Vansteenkiste et al., 2004), report greater health (Ng et al., 2012) and report lower anxiety symptoms (Sheehan et al., 2018).

Overall, it seems that the co-occurrence of rational beliefs and autonomous motivation (without controlled motivation) is conducive to lesser anxiety symptomology and functional behaviours (e.g., withdrawal when injured). In particular, without the need to compete, and the perception that enjoyment and love for running supersedes all other motives, behaviours are likely to be adaptive for long term health, and anxiety symptomology is less likely to come to fruition.

Discussion

A rational approach to competition, alongside competing for the love and enjoyment of the event is likely to contribute to lesser anxiety symptoms and functional behaviours such as withdrawing when injured. However, the irrational need to compete, irrespective of adversity such as injury, alongside frustration intolerance and fear of dismissal from peers is likely to enhance doubt, fear of failure, concentration disruption, somatic symptoms, as well as persistence through injuries and withdrawal from the sport. In sum, the stories surrounding motivation regulation and anxiety highlight that an illogical need to compete is likely to coincide with dysfunctional behaviours (i.e., withdrawal from the sport, persistence through injury) and fear of dismissal from peers, leading to doubt, fear of failure, concentration disruption and somatic symptoms. On the other hand, understanding that it may not be possible to compete in an event sometimes (e.g., illness), and competing because there is a genuine affection for running, doubts, fears and somatic symptoms are not likely to come to fruition.

General Discussion

The main aim of the present research was to evidence the associations between irrational beliefs, motivation regulation and competitive anxiety, and evidence why this may be the case. To achieve this aim, two study phases were undertaken where elite ultra-marathon runners completed a battery of surveys in relation to their running behaviours (phase 1), and then interviewed to understand whether and why the primary variables were associated (phase 2). The current study is the first to investigate the association between irrational beliefs, motivation regulation and anxiety in ultra-marathon runners.

In accordance with previous research, the results across both the study phases revealed that irrational beliefs are concomitant with controlled forms of motivation, in turn associating with symptoms of anxiety. The current research extends previous research by investigating the interactions between irrational beliefs, motivation

regulation and anxiety symptomology of ultra-marathon athletes both within statistical analyses, and verbal oration. The association between irrational beliefs and organismic integration has existed as a theoretical postulation (e.g., Turner, 2016; Van Wijhe et al., 2013), with only some REBT intervention research evidencing clear associations (e.g., Davis & Turner, 2019). The present research evidences the implicated bridging of irrational beliefs and organismic integration, and the effects these beliefs and regulations can have on anxiety symptomology.

Based on the results, it is possible to understand why both irrational beliefs and controlled forms of motivation increase likelihood of dysfunctional behaviours and anxiety symptoms. As an individual's illogical and rigid beliefs about performance increases ("I must perform well, and I cannot stand it if I don't") alongside an insatiable need to perform to avoid punishment (i.e., ridicule), or gain a reward (i.e., a medal), self-imposed pressure to perform is likely to increase, leading to dysfunctional behaviours, heightened cognitive anxiety, somatic anxiety and concentration disruption. These postulates were evidenced in the athletes' stories, noting that an irrational need to compete, alongside frustration intolerance and fear of dismissal from peers is likely to enhance doubt, fear of failure and concentration disruption, leading athletes to persist through injury, and even withdraw from the sport entirely. Here, the dual impact of both rigid, extreme, illogical beliefs alongside controlled forms of motivation are likely to effect anxiety responses and functionality of ultra-marathon athletes' behaviours. Conversely, it is also possible to understand how rational beliefs about competition alongside autonomous motivation regulation can protect against maladaptive anxiety responses (i.e., concentration disruption). Without the rigid belief that one must perform well, and not seeing one's self-worth as dependent on their ability to perform, whilst possessing a passion and love for the activity, is likely to protect an individual against rumination on uncontrollable constructs (e.g., judgement from others), and thoughts on withdrawing from the activity. In other words, if an athlete does not berate themselves ("I am a loser if don't finish the race") when they do not compete, and have a genuine affection for the activity, it is possible to envisage the positive effects this can have on the way an ultra-marathon runner will approach competitive scenarios (e.g., withdraw when injured, enjoy the activity).

Given the brutal, endemic nature of the lifestyle that ultra-marathon runners have (Nixdorf et al., 2016), and the effects these lifestyles can have on the athletes' mood (Eichner, 1995), sleep and vitality (Davis & Turner, 2019), understanding their beliefs and motivation to keep up this lifestyle effectively (without undue anxiety) is advantageous. It seems that an athlete of this level is likely to function effectively, without undue anxiety, when beliefs about competition are logical and pragmatic, and their reason for participating is genuine and autonomous. With the intimated problems that can arise from self-depreciative beliefs, even with autonomous motives for behaviour (i.e., integrated regulation), it is best to avoid extreme, illogical language in the attempt to rebut any harmful effects to mental health. With a 1696% increase in participation in ultra-marathon running in the last 25 years (Distance Plus, 2020), this only reinforces the need to understand how ultra-marathon runners can persist in an effective manner.

In a comparable sample of triathletes, Davis and Turner (2019) ran an REBT intervention in the aim to improve triathletes' wellbeing. In doing as such, the authors evidenced that REBT was effective at reducing irrational beliefs, increasing autonomous motivation, and improving sleep quality and vitality of athletes. Coupling the aforementioned results from Davis and Turner (2019) with the results of the present research, it can be intimated that the occurrence of both irrational beliefs and controlled forms of motivation is maladaptive for long-distance elite athletes' cognitions, and that REBT may be an effective intervention to reduce irrational beliefs and increase autonomous motivation. However, future research should endeavor to understand the efficacy of REBT interventions with ultra-marathon runners in; (a) reducing irrational beliefs, (b) improving autonomous motivation, and c) to improve anxiety symptomology.

Practical Recommendations

The findings of the present research provide implications for competitive anxiety responses of ultra-marathon athletes. Practitioners should work with such athletes who present both high irrational beliefs and low self-determined motivation, in the aim to improve anxiety symptomology, and thus longer-term health and performance. The current research intimates that REBT may be an effective intervention to alleviate irrational beliefs and increase self-determined motives based on previous findings. It would be fruitful for future research to identify the efficacy of an REBT programme on anxiety symptomology of ultra-marathon runners. Additionally, self-determination-based interventions may also prove fruitful in improving anxiety symptomology. Here, the aim would be to explore more self-determined motives for engagement (Ntoumanis et al., 2020), developing greater perceptions of competence, autonomy, and relatedness (known as the Basic Psychological needs; Ntoumanis et al., 2020). This could be achieved by developing an autonomy supportive environment (Ntoumanis et al., 2018).

Though, whilst it may be advantageous to explore the efficacy of REBT and SDT based interventions, it is worth noting that the mere presence of irrational beliefs may not automatically lead to heightened anxiety responses, amongst other negative mental health outcomes as previously found (Turner et al., 2019a, 2019b). There are other factors that can determine the likelihood of any negative outcomes arising such as automatic thoughts (Buschmann et al., 2018), and now, potentially, multidimensional motivation. Multidimensional motivation and automatic thoughts may play a key role in whether any negative outcomes may arise as a result of irrational beliefs (e.g., concentration disruption, cognitive anxiety). Future research may wish to examine whether and to what extent motivation mediates the relationship between irrational beliefs and a multitude of health outcomes in ultra-marathon runners, whilst exploring the unique stories of these individuals in identifying whether beliefs and motives associate with additional health outcomes. In sum, findings of the present research lay the foundation for practitioners to support the wellbeing of ultra-marathon athletes. Based on the findings, we would encourage practitioners to

reinforce rational ideals (e.g., logical, pragmatic), and create autonomy supportive environments.

Limitations

Whilst there are strengths of the study and approach taken, being both questionnaire-based and interview-based research, the data comes with a few limitations. Namely, the sample within phase 1 was not extensive. That said, given the nature of the sample that data was collected from (i.e., elite ultra-marathon runners), a fair representation of that sample was identified. In addition, there is the assumption with questionnaire-based research that participants are honest in their responses. Given that phase 1 assessed anxiety, it may have been the case that participants underreported symptoms (Roberts et al., 2016). The cross-sectional nature of phase 1 provides a static representation of what may be dynamic constructs. It may be the case that anxiety could change over time, and thus it would be worth understanding whether changes in anxiety may be a result of changes in beliefs and motives. Future research may wish to identify longitudinal associations between irrational beliefs, motivation regulation and anxiety symptomology, in turn edging closer to a cause-and-effect relationship. In Phase 2, there are many benefits to conducting narrative analyses, notwithstanding the in-depth data that can reveal the meaning behind associations between variables (Darpatova-Hruzewicz, 2022; Smith & Sparkes, 2016). That said, the content of the interviews is linguistically subjective, and with seven interviews conducted will not provide significant depth on why the variables may or may not be associated.

Conclusions

This paper provides evidence for the associations between irrational beliefs, motivation regulation and anxiety symptomology in ultra-marathon athletes. Specifically, irrational beliefs and maladaptive motivation regulation is conducive to greater anxiety symptomology. In addition, it was highlighted that an illogical need to compete is likely to coincide with fear of dismissal from peers, leading to doubt, fear of failure and concentration disruption. On the other hand, when it is understood that competing is not possible sometimes, and when there is a genuine affection for running, athletes' doubts and fears are less likely to come to fruition. Findings provide some useful implications for practitioners within REBT and SDT, and future research should aim to enhance the conceptual understanding of REBT and SDT.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval The research was ethically approved by relevant institutions. The research involved human participants, all of whom provided informed consent prior to collection of data.

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References


- Balkis, M., & Duru, E. (2018). Procrastination, self-downing, self-doubt, and rational beliefs: A moderated mediation model. *Journal of Counseling & Development, 96*(2), 187–196. <https://doi.org/10.1002/jcad.12191>
- Berry, W. D., Feldman, S., & Stanley Feldman, D. (1985). *Multiple regression in practice* (No. 50). Sage.
- Buschmann, T., Horn, R., Blankenship, V. R., Garcia, Y. E., & Bohan, K. J. (2018). The relationship between automatic thoughts and irrational beliefs predicting anxiety and depression. *Journal of Rational - Emotive and Cognitive - Behavior Therapy, 136*, 137–162. <https://doi.org/10.1007/s10942-017-0278-y>
- Chadha, N. J., Turner, M. J., & Slater, M. J. (2019). Investigating irrational beliefs, cognitive appraisals, challenge and threat, and affective states in golfers approaching competitive situations. *Frontiers in psychology, 10*, 2295. <https://doi.org/10.3389/fpsyg.2019.02295>
- Chamberlain, J. M., & Haaga, D. A. (2001). Unconditional self-acceptance and psychological health. *Journal of Rational-Emotive and Cognitive-Behavior Therapy, 19*(3), 163–176. <https://doi.org/10.1023/A:1011189416600>
- Chrysidis, S., Turner, M. J., & Wood, A. G. (2020). The effects of REBT on irrational beliefs, self-determined motivation, and self-efficacy in American Football. *Journal of Sports Sciences, 38*(19), 2215–2224. <https://doi.org/10.1080/02640414.2020.1776924>
- Cresswell, S. L., & Eklund, R. C. (2005). Motivation and burnout in professional rugby players. *Research Quarterly For Exercise and Sport, 76*(3), 370–376.
- Darpatova-Hruzewicz, D. (2022). Reflexive confessions of a female sport psychologist: From REBT to existential counselling with a transnational footballer. *Qualitative Research in Sport, Exercise and Health, 14*(2), 306–325. <https://doi.org/10.1080/2159676X.2021.1885481>
- Davis, H., & Turner, M. J. (2019). The use of rational emotive behaviour therapy (REBT) to increase the self-determined motivation and psychological wellbeing of triathletes. *Sport, Exercise, and Performance Psychology*. Advance online publication. <https://doi.org/10.1037/spy0000191>
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum Publishing Corporation.
- Deen, S., Turner, M. J., & Wong, R. S. (2017). The effects of REBT, and the use of credos, on irrational beliefs and resilience qualities in athletes. *The Sport Psychologist, 31*(3), 249–263. <https://doi.org/10.1123/tsp.2016-0057>
- Distance Plus (2020). Statistics. Retrieved from: <https://distances.plus/en/community/popularity-ultras-run-repeat-study-2020/>
- Dryden, W., & Branch, R. (2008). *The fundamentals of rational-emotive behavior therapy*. Wiley.
- Eichner, E. R. (1995). Overtraining: Consequences and prevention. *Journal of Sports Sciences, 13*(S1), 41-S48.
- Ellis, A. (1957). Rational psychotherapy and individual psychology. *Journal of Individual Psychology, 13*, 38–44.
- Ellis, A. (1995). Changing rational-emotive therapy (RET) to rational emotive behavior therapy (REBT). *Journal of Rational-Emotive & Cognitive-Behavior Therapy*.

- Field, A. (2017). *Discovering statistics using IBM SPSS Statistics* (5th edition). London: SAGE Publications Ltd.
- Grolnick, W. S., & Ryan, R. M. (1987). Autonomy in children's learning: an experimental and individual difference investigation. *Journal of personality and social psychology*, 52(5), 890–898.
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1995). *Multivariate Data Analysis* (3rd edition). Macmillan.
- Howard, J. L., Gagné, M., Van den Broeck, A., Guay, F., Chatzisarantis, N., Ntoumanis, N., & Pelletier, L. G. (2020). A review and empirical comparison of motivation scoring methods: An application to self-determination theory. *Motivation and Emotion*. <https://doi.org/10.1007/s11031-020-09831-9>
- Howard, J. L., Gagné, M., Van den Broeck, A., Guay, F., Chatzisarantis, N., Ntoumanis, N., & Pelletier, L. G. (2020). A review and empirical comparison of motivation scoring methods: An application to self-determination theory. *Motivation and Emotion*, 44(4), 534–548. <https://doi.org/10.1007/s11031-020-09831-9>
- Lonsdale, C., & Hodge, K. (2011). Temporal ordering of motivational quality and athlete burnout in elite sport. *Medicine & Science in Sports & Exercise*, 43(5), 913–921.
- MacInnes, D. (2004). The theories underpinning rational emotive behavior therapy: Where's the supportive evidence? *International Journal of Nursing Studies*, 41, 685–695. <https://doi.org/10.1016/j.ijnurstu.2004.02.004>
- Markland, D., & Ingledew, D. K. (2007). The relationships between body mass and body image and relative autonomy for exercise among adolescent males and females. *Psychology of Sport and Exercise*, 8(5), 836–853. <https://doi.org/10.1016/j.psychsport.2006.11.002>
- McLoughlin, E., Fletcher, D., Slavich, G. M., Arnold, R., & Moore, L. J. (2021). Cumulative lifetime stress exposure, depression, anxiety, and well-being in elite athletes: A mixed-method study. *Psychology of Sport and Exercise*, 52, 101823. <https://doi.org/10.1016/j.psychsport.2020.101823>
- Meijen, C., Turner, M., Jones, M. V., Sheffield, D., & McCarthy, P. (2020). A theory of challenge and threat states in athletes: A revised conceptualization. *Frontiers in psychology*, 11, 126. <https://doi.org/10.3389/fpsyg.2020.00126>
- Mesagno, C., Tibbert, S. J., Buchanan, E., Harvey, J. T., & Turner, M. J. (2020). Irrational beliefs and choking under pressure: A preliminary investigation. *Journal of Applied Sport Psychology*. Advance online publication. <https://doi.org/10.1080/10413200.2020.1737273>
- Mullen, R., Hardy, L., & Tattersall, A. (2005). The effects of anxiety on motor performance: A test of the conscious processing hypothesis. *Journal of Sport and Exercise Psychology*, 27(2), 212–225. <https://doi.org/10.1123/jsep.27.2.212>
- Ng, J. Y. Y., Ntoumanis, N., Thøgersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-determination theory applied to health contexts: A meta-analysis. *Perspectives on Psychological Science*, 7(4), 325–340. <https://doi.org/10.1177/1745691612447309>
- Nixdorf, I., Frank, R., & Beckmann, J. (2016). Comparison of athletes' proneness to depressive symptoms in individual and team sports: Research on psychological mediators in junior elite athletes. *Frontiers in psychology*, 7, 893. <https://doi.org/10.3389/fpsyg.2016.00893>
- Ntoumanis, N., Ng, J. Y., Prestwich, A., Quested, E., Hancox, J. E., Thøgersen-Ntoumani, C., & Williams, G. C. (2020). A meta-analysis of self-determination theory-informed intervention studies in the health domain: Effects on motivation, health behavior, physical, and psychological health. *Health Psychology Review*. <https://doi.org/10.1080/17437199.2020.1718529>
- Ntoumanis, N., Quested, E., Reeve, J., & Cheon, S. H. (2018). Need supportive communication: Implications for motivation in sport, exercise, and physical activity. In *Persuasion and Communication in Sport, Exercise, and Physical Activity*, pp. 155–169.
- Pelletier, L. G., Rocchi, M. A., Vallerand, R. J., Deci, E. L., & Ryan, R. M. (2013). Validation of the revised sport motivation scale (SMS-II). *Psychology of Sport and Exercise*, 14(3), 329–341. <https://doi.org/10.1016/j.psychsport.2012.12.002>
- Roberts, C., Faull, A., & Tod, D. (2016). Blurred lines: Performance enhancement, common mental disorders and referral in the U.K. athletic population. *Frontiers in Psychology*, 7, 1067. <https://doi.org/10.3389/fpsyg.2016.01067>
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic 8 definitions and new directions. *Contemporary Educational Psychology*, 25, 54–56.
- Saint-Martin, S. V., Turner, M. J., & Ruiz, M. C. (2020). Mental preparation of olympic and paralympic swimmers: Performance-related cognitions and emotions, and the techniques used to manage them. *Journal of Physical Education and Sport*, 20, 3569–3579. <https://doi.org/10.7752/jpes.2020.06481>

- Sheehan, R. B., Herring, M. P., & Campbell, M. J. (2018). Associations between motivation and mental health in sport: A test of the hierarchical model of intrinsic and extrinsic motivation. *Frontiers in Psychology*, 9, 707. <https://doi.org/10.3389/fpsyg.2018.00707>
- Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivating learning, performance, and persistence: the synergistic effects of intrinsic goal contents and autonomy-supportive contexts. *Journal of personality and social psychology*, 87(2), 246–260. <https://doi.org/10.1037/0022-3514.87.2.246>
- Smith, M. (2011). *Research methods in accounting* (2nd ed.). SAGE Publications Ltd.
- Smith, R. E., Smoll, F. L., Cumming, S. P., & Grossbard, J. R. (2006). Measurement of multidimensional sport performance anxiety in children and adults: The Sport Anxiety Scale-2. *Journal of Sport and Exercise Psychology*, 28(4), 479–501. <https://doi.org/10.1123/jsep.28.4.479>
- Smith, B., & Sparkes, A. C. (Eds.). (2016). *Routledge handbook of qualitative research in sport and exercise*. Taylor & Francis.
- Sturm, D. J., Bachner, J., Renninger, D., Haug, S., & Demetriou, Y. (2021). A cluster randomized trial to evaluate need-supportive teaching in physical education on physical activity of sixth-grade girls: A mixed method study. *Psychology of Sport and Exercise*, 54, 101902. <https://doi.org/10.1016/j.psychsport.2021.101902>
- Turner, M. J. (2016). Rational Emotive Behavior Therapy (REBT), irrational and rational beliefs, and the mental health of athletes. *Frontiers in Psychology*, 7, 1423. <https://doi.org/10.3389/fpsyg.2016.01423>
- Turner, M. J., & Allen, M. S. (2018). Confirmatory factor analysis of the irrational Performance Beliefs Inventory (iPBI) in a sample of amateur and semi-professional athletes. *Psychology of Sport and Exercise*, 35, 126–130.
- Turner, M. J., Aspin, G., & Gillman, J. (2019). Maladaptive schemas as a potential mechanism through which irrational beliefs relate to psychological distress in athletes. *Psychology of Sport and Exercise*, 44, 9–16. <https://doi.org/10.1016/j.psychsport.2019.04.015>
- Turner, M., & Barker, J. B. (2013). Examining the efficacy of rational-emotive behavior therapy (REBT) on irrational beliefs and anxiety in elite youth cricketers. *Journal of Applied Sport Psychology*, 25(1), 131–147. <https://doi.org/10.1080/10413200.2011.574311>
- Turner, M. J., Allen, M. S., Slater, M. J., Barker, J. B., Woodcock, C., Harwood, C. G., & McFadyen, K. (2018). The development and initial validation of the Irrational Performance Beliefs Inventory (iPBI). *European Journal of Psychological Assessment*, 34(3), 174–180. <https://doi.org/10.1027/1015-5759/a000314>
- Turner, M. J., Carrington, S., & Miller, A. (2019). Psychological distress across sport participation groups: The mediating effects of secondary irrational beliefs on the relationship between primary irrational beliefs and symptoms of anxiety, anger, and depression. *Journal of Clinical Sport Psychology*, 13(1), 17–40. <https://doi.org/10.1123/jcsp.2017-0014>
- Turner, M. J., & Davis, H. (2019). Exploring the effects of Rational Emotive Behaviour Therapy (REBT) on the irrational beliefs and self-determined motivation of triathletes. *Journal of Applied Sport Psychology*, 31(3), 253–272. <https://doi.org/10.1080/10413200.2018.1446472>
- Turner, M. J., Miller, A., Youngs, H., Barber, N., Brick, N. E., Chadha, N. J., ... & Rossato, C. J. L. (2022). “I must do this!”: A latent profile analysis approach to understanding the role of irrational beliefs and motivation regulation in mental and physical health. *Journal of Sports Sciences*, 1-16. <https://doi.org/10.1080/02640414.2022.2042124>
- Van Wijhe, C., Peeters, M., & Schaufeli, W. (2013). Irrational beliefs at work and their implications for workaholism. *Journal of Occupational Rehabilitation*, 23, 336–346. <https://doi.org/10.1007/s10926-012-9416-7>
- Weiss, M. R., & Ambrose, A. J. (2008). Motivational orientations and sport behavior. In T. S. Horn (Ed.), *Advances in sport psychology* (3rd ed., pp. 115–155). Human Kinetics.
- Wood, A. G., & Turner, M. J. (2019, March 15). Why some people can't stop running, according to sport psychology. *The Conversation*. <https://theconversation.com/why-some-people-cant-stop-running-according-to-sport-psychology-112339>
- Wood, A., Mack, R., & Turner, M. (2020). Developing self-determined motivation and performance with an Elite Athlete: integrating motivational interviewing with rational emotive behavior therapy. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 38(4), 540–567.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

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