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The use of rational emotive behaviour therapy (REBT) to increase the self-determined motivation and psychological wellbeing of triathletes.

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1 Abstract

2 Rational Emotive Behaviour Therapy (REBT) and its relationship with self-determined
3 motivation has received scant research attention despite growing interest in the motivational
4 effects of REBT with athletes. Recent evidence suggests that reductions in irrational beliefs
5 brought about by REBT may facilitate increases in self-determined motivation. The current
6 study seeks to replicate and build this initial research using an idiographic single-case design
7 to assess the effects of one-to-one REBT on the irrational beliefs, self-determined motivation,
8 vitality, and sleep quality of four amateur triathletes. Self-report data were collected prior to,
9 during, and after the REBT intervention. Visual analysis revealed that reductions in irrational
10 beliefs were met with concomitant increases in self-determined motivation, vitality, and sleep
11 quality. Social validation data supported the visual analysis findings. This current study
12 supports and extends research by offering further advances in our understanding of the
13 potential relationships between REBT, self-determined motivation, and athlete wellbeing.
14 Keywords: CBT; counselling; sport; mental health; case-study

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1 The organismic integration theory (OIT; Ryan & Deci, 2000), that sits with the self-
2 determination theory (SDT), considers that motivation can be classified along a linear
3 continuum of self-determination. In OIT, motivation is classified within six main categories
4 that fall on a continuum from intrinsic motivation (i.e., behaviour driven by internal rewards,
5 such as satisfaction) to amotivation (i.e., lack of any motivation; Deci & Ryan, 1985). Along
6 the continuum from less to more self-determined motivation, there are four extrinsic levels:
7 external regulation, introjected regulation, identified regulation and integrated regulation.
8 External regulation and introjected regulation are considered to be controlling (or less self-
9 determined) motives, as opposed to autonomous (or more self-determined) motives captured
10 by identified regulation and integrated regulation. External regulation and introjected
11 regulation are considered to be controlling (or low self-determined) forms of motivation, and
12 more controlled motives are associated with maladaptive outcomes including low levels of
13 persistence, negative affect, and poor performance on heuristic activities (Deci & Ryan,
14 2008). In contrast, self-determined forms of motivation (intrinsic, integrated and identified
15 regulation) have been found to be related to higher levels of effort, engagement, and task
16 persistence and wellbeing (Deci & Ryan, 2000). Therefore, interventions that can help
17 athletes to foster more self-determined types of motivation are valuable and worthy of
18 scientific enquiry.

19 One approach that can help athletes overcome adversity and foster self-determined
20 motivation, which is increasingly appearing in sport literature (see Turner, 2016 for a
21 review), is rational emotive behaviour therapy (REBT; Ellis, 1957). REBT is the first
22 cognitive-behavioural approach in psychological therapy and is an established form of
23 psychological intervention supported across numerous diverse clinical and non-clinical
24 populations (David, Lynn, & Ellis, 2010). In REBT irrational and rational beliefs are at the
25 centre of emotional and behavioural functionality, and the theory and practice of REBT is

1 guided by an ABC framework (Dryden & Branch, 2008). The therapeutic process of REBT
2 encourages individuals to understand that when facing adversity (A) it is their beliefs (B)
3 about the adversity that directs their emotional and behavioural responses (C), not the
4 adversity alone. In other words, it is not events (A) that directly cause emotions and
5 behaviours (C), rather, it is one's beliefs (B) about the events that lead to emotional and
6 behavioural reactivity. As such, an athlete's ability to respond to adversity adaptively is
7 dependent on the mediating role of irrational and rational beliefs. In addition, there are four
8 irrational beliefs – primary irrational beliefs (or demandingness), awfulizing, low frustration
9 tolerance, and depreciation – that are extreme, rigid, illogical and four opposing rational
10 beliefs -primary rational beliefs (or preferences), anti-awfulizing, high frustration tolerance,
11 and unconditional acceptance – that are non-extreme, flexible, and logical. Irrational beliefs
12 can lead to dysfunctional emotions, such as depression, and maladaptive behaviours
13 (withdrawal), whereas rational beliefs lead to functional emotions (sadness) and adaptive
14 behaviours (express feeling to others; Dryden & Branch, 2008). As such, a fundamental aim
15 of REBT is to reduce irrational beliefs, and augment rational beliefs. To do this, the ABC
16 framework is extended to an ABCDE framework whereby irrational beliefs are disputed (D)
17 and alternative rational beliefs are encouraged with a view to promoting functional emotions
18 (sadness) and adaptive behaviours (E).

19 Growing literature supports the application of REBT with athletes across a range of
20 sports and levels, with some research indicating a positive effect on performance and
21 wellbeing (e.g., Wood, Barker, & Turner, 2019). However, the mechanisms through which
22 REBT may elicit enhanced performance and wellbeing are not well understood (Turner,
23 2019). Referring to the potential link between REBT and motivation, Turner (2016)
24 suggested that one potential mechanism is motivation, which has received debate in literature
25 (e.g., Turner, 2016). Specifically, Turner (2016) suggested that irrational beliefs may reflect

1 less self-determined types of motivation regulation with reference to OIT (Ryan & Deci,
2 2000), within SDT. Researchers have inferred that irrational beliefs could be related to
3 introjected regulation (e.g., Turner, 2016; Van Wijhe, Peeters, & Schaufeli, 2013), that is
4 where one has a perception that “I must” or “I have to” engage in an activity. The perception
5 that one must or ought to engage in an activity is considered typical of introjected regulation
6 (e.g., Gillison, Osborn, Standage, & Skevington, 2009). This language of “must” and
7 “should” is common in REBT literature (Ellis & Dryden, 1997). In one study introjected
8 regulation was positively related to expending more effort, but it was also related to feeling
9 more anxiety and coping more poorly with failures (Ryan & Connell, 1989). In sport, greater
10 self-determined types of motivation have been related to superior performance (Gillet, Berjot,
11 & Gobance, 2009), persistence (Sarrazin, Vallerand, Guillet, Pelletier, & Curry, 2002), and
12 greater wellbeing (Gagné, Ryan, & Bargmann, 2003). Therefore, as Turner (2016) postulated,
13 it is possible that the similar language expressed in irrational beliefs and introjected
14 regulation might be detrimental to affective and behavioural responding in athletes.

15 Only one study (Turner & Davis, 2018) has directly examined the relationship
16 between irrational beliefs and self-determined motivation. Findings indicated that group-level
17 REBT led to decreased irrational beliefs in amateur triathletes, and as irrational beliefs
18 reduced, self-determined motivation increased. Whilst promising, Turner and Davis’ (2018)
19 initial study contained some limitations including the use of an outdated self-report
20 measurement for self-determined motivation, and the use of group-REBT instead of one-to-
21 one REBT, which did not consider the idiosyncratic nature of how athletes responded to
22 REBT. In addition, whilst it is interesting that self-determined motivation was increased as a
23 result of REBT, the influence of this shift on the wellbeing of the athletes was not considered.
24 Indeed, although research applying REBT in athletes is growing, very little of this research
25 has focused on athlete wellbeing. This is despite evidence that irrational beliefs are a risk

1 factor for a vast array of outcomes relevant to mental health (Visla, Fluckinger, Grosse
2 Holtforth, & David, 2015), and that in athlete samples, irrational beliefs are positively related
3 to psychological distress (Turner, Aspin, & Gillman, 2019; Turner, Carrington, & Miller,
4 2019), and increased in burnout (Turner & Moore, 2016).

5 REBT is at its core a theory of human functioning (David, Szentagotai, Eva, &
6 Macavei, 2005) and as such one of its aims is to promote wellbeing (Chen, 2006). Wellbeing
7 has been challenging to define (Dodge, Daly, Huyton, & Sanders, 2012), but in the current
8 study we subscribe to the idea that wellbeing in part constitutes perception of energy and
9 vitality, with sleep being an important part of this (e.g., Schickler, 2005). Therefore, for the
10 first time in sport research, we also examine the effects of REBT on self-reported vitality and
11 sleep quality (wellbeing). Vitality is a positive feeling of aliveness and is functionally
12 significant for human motivation and wellbeing (Ryan & Deci, 2008), and sleep is essential
13 for emotional health (Nadler et al., 2003). There exists some evidence that REBT can
14 enhance sleep quality (e.g., Newman, 2014), and a corpus of evidence linking REBT to
15 improvements in wellbeing (see Turner, 2016, for a review). In addition, SDT research shows
16 that the more autonomous a person's motivation, the greater their wellbeing (Ryan, 2009).
17 Therefore, the present study explores the effects of REBT on self-determined motivation and
18 wellbeing dimensions of vitality and sleep.

19 Chiefly, this study builds on the growing research evidence for the use of REBT with
20 athletes, but also importantly addresses the dearth of literature regarding the self-determined
21 motivation of triathletes (Grand'Maison, 2004) in which there is little consensus regarding
22 which types of motivation are important (Lamont & Kennelly, 2012). Despite its increasing
23 popularity triathlon has not been extensively studied (Dolan, Houston, & Martin, 2011).
24 Researchers have suggested similar motivational profiles for both professional and amateur
25 male and female triathletes with the exception of amotivation (López-Fernández, Merino-

1 Márban, & Fernández-Rodríguez, 2014), and that elite female triathletes report greater
2 intrinsic motivation than extrinsic motivation (Waddle-Smith, 2010). In contrast, extrinsic
3 motivation was more prevalent than intrinsic motivation in Lamont and Kennelly's (2012)
4 study, which adopted an SDT framework. Therefore, an investigation into ways in which
5 self-determined motivation can be promoted in triathletes may be valuable to those providing
6 sport psychology services to triathletes. To this end, the current study seeks to extend the
7 work of Turner and Davis (2018) by applying one-to-one REBT idiosyncratically, with a
8 view to increasing the self-determined motivation and psychological wellbeing of amateur
9 triathletes. The present study contributes to the increase of idiographic research approaches in
10 sport and exercise psychology (Meredith, Dicks, Noel, & Wagstaff, 2018), a method
11 encouraged by` scholars to seek improvements in scientific understanding to inform applied
12 practice (Martens, 2007; Tenenbaum, Eklund, & Kamata 2012). This study also builds on the
13 extant REBT literature by examining the use of REBT in facilitating athlete wellbeing, as
14 marked by vitality and sleep quality. It is hypothesized that REBT will reduce irrational
15 beliefs and increase self-determined motivation and wellbeing in four triathletes.

16 **Method**

17 **Participants**

18 The first author is a member of a large U.K. Triathlon club that provides specific
19 training to more than 200 adult members, ranging from age groupers to fitness enthusiasts. As
20 such, the triathletes recruited for the current study represented a convenience sample. Four
21 triathlon club members (2 female, 2 male) between 32 and 53 years of age ($M = 41.75$, $SD =$
22 8.77) took part in the study. Club membership ranged between 6 months and 1.7 years ($M =$
23 1.6 , $SD = 1.05$). Participants were selected from 45 members (28 male, 17 female) between
24 18 and 76 years old ($M = 46.83$, $SD = 13.43$). As part of a screening process for the study,
25 participants were ranked according to their score in the irrational Performance Beliefs

1 Inventory (iPBI; Turner et al., 2018) and their self-determined motivation (index) scores. In
2 line with recommendations based on norm levels of irrational beliefs amongst athletes
3 (Turner & Allen, 2018), only respondents with high irrational performance beliefs (scores
4 above 18 out of 35; $M = 26.5$, $SD = 1.99$) and low self-determination index scores (scores
5 under 40; $M = 25$, $SD = 10.42$) were invited to participate in the study. Four participants were
6 selected, who were all unknown to the researcher, and were available for the study.
7 Participants were selected in order to facilitate the idiographic and detailed analysis of
8 intervention effects whereby more could be learned by studying fewer participants (Normand,
9 2016). The university granted ethical approval, and participants completed informed consent
10 prior to all data collection.

11 **Design**

12 The study employed an explanatory idiographic single-case design (e.g., Neil et al.,
13 2013), where participants received a personalised and tailored intervention, across five one-
14 to-one REBT sessions for each participant (Table 1). The personalisation and tailoring of
15 each participant's intervention was reflected in the differing lengths and content of each
16 session. This is in contrast to some past research (Turner & Barker, 2013) that standardised
17 sessions across participants, unreflective the idiosyncrasies of using REBT with athletes. The
18 use of an idiographic single-case design in the current study is important because
19 accountability through intervention evaluation is one of the most essential issues
20 underpinning professional practice (Barker, Mellalieu, McCarthy, Jones, & Moran, 2013).
21 Single-case experimental designs are advantageous because they more readily permit the
22 intensive investigation of each subject and data from just a few subjects tells a story
23 (Normand, 2016). An idiographic single case research design can report the outcome of the
24 intervention for each participant individually (e.g., Neil et al., 2013), allowing for a better
25 understanding of interventions designed to improve performance and mental states (Voight,

1 2012) and can link existing theory in real-life situations (Willig, 2013). The idiographic
2 approach enables independent variables to be manipulated within the context of carefully
3 measured and repeatedly assessed dependent variables (Barlow & Nock, 2009); a method
4 which is particularly useful for progress monitoring over the course of an intervention (Lyon
5 et al., 2017). A member-checking interview was conducted, recorded and visually inspected
6 to ensure that participants' own meanings and perspectives were represented (Birt, Scott,
7 Cavers, Campbell, & Walter 2016; Tong, Sainsbury, & Craig, 2007).

8 Data were collected over a 20-week period from baseline through to post-intervention
9 phases (see Table 2). Baseline data for all four participants revealed sufficient levels of
10 irrational beliefs ($M = 26.5$, $SD = 1.99$; Turner et al., 2018) and low self-determination index
11 scores ($M = 25$, $SD = 10.42$) to warrant an REBT intervention. The intensive study of
12 participants over time, typical of idiographic studies, enables practitioners to tailor specific
13 support to promote individual success (Barlow, Nock, & Hersen, 2008) however due to small
14 sample size credibility of data should be viewed with caution (Anderson, Miles, Mahoney, &
15 Robinson, 2002).

16 **Measures**

17 **Irrational Beliefs.** The iPBI (Turner et al., 2018) consists of 28-items measuring the
18 four core irrational beliefs of REBT; demandingness (seven items), awfulizing (seven items),
19 low frustration tolerance (seven items), and depreciation (seven items). Each item is rated on
20 a 5-point Likert-scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores
21 indicate stronger beliefs. The iPBI provides a context-specific measure of irrational beliefs in
22 performance environments and has shown construct (alpha reliability between .90 and .96),
23 concurrent (medium to large correlations reported) and predictive (small to medium
24 correlations reported) validity (Turner & Allen, 2018). The iPBI has been used with
25 triathletes in past research (e.g., Turner & Davis, 2018), and has a good factor structure

1 (RMSEA = .07; CFI = .93; NNFI = .92, SRMR = .06;), according to confirmatory factor
2 analysis (Turner et al., 2018).

3 **Motivation.** The Sport Motivation Scale-II (SMS-II; Pelletier, Rocchi, Vallerand,
4 Deci and Ryan, 2013) is an 18-item measurement instrument used to assess six types of
5 behavioural regulations (amotivation, external regulation, interjected regulation, identified
6 regulation, integrated regulation, and intrinsic motivation). Each item is rated on a 7-point
7 Likert-scale ranging from 1 (*not true at all*) to 7 (*very true*). The SMSII has a good factor
8 structure (RMSEA = .05; CFI = .93; TLI = .91), according to the confirmatory factor analysis
9 and good Cronbach's alpha coefficients (from .70 to .88) as reported by Pelletier, Rocchi,
10 Vallerand, Deci & Ryan, (2013). In sum, the SMS-II is a complete and valid instrument for
11 sport motivation research (Viciano, Mayorga-Vega, Guijarro-Romero, Martinez-Baena, &
12 Blanco, 2017). Using procedures outlined by Vallerand (2001), an index of self-determined
13 motivation (SDI) was calculated by multiplying each subscale of the SMSII by an assigned
14 weight in accordance with its location on the OIT (e.g., Gillet, Vallerand, Amoura, & Baldes,
15 2010). The product of scores is then summed to form a self-determination index (SDI), also
16 known as a relative autonomy index (RAI), in which a higher score reflects greater self-
17 determined (or autonomous) motivation. The SDI has been used previously in athlete samples
18 (e.g., Hill, Curran, Hall, & Appleton, 2011) and has the advantage of reducing the number of
19 variables included in data analyses, which is important for brevity of data reporting.

20 **Vitality.** Vitality was measured using the 6-item Subjective Vitality Scale (SVS;
21 Ryan & Frederick, 1997), recommended by Bostic, Rubio and Hood (2000). Vitality is a
22 positive feeling of aliveness and functionally significant for human motivation and wellbeing
23 (Ryan & Deci, 2008). Vitality is salient to this study having been extensively validated and
24 widely used in research on motivation and wellbeing (Kawabata, Yamazaki, Guo, &
25 Chatzisarantis, 2017). The SVS requires athletes to respond to statements in relation to the

1 extent it applies to them and apply their life at the present time (e.g., “I feel alive and vital”).
2 A single score is computed by averaging the respondents scores across the 6-items.
3 Participants were asked to rate the extent to which they experienced vitality using a 7-point
4 Likert-scale ranging from 1 (*not at all true*) to 7 (*very true*). The SVS has shown internal
5 reliability with a Cronbach’s alpha value of .80 (Bostic et al., 2000).

6 **Sleep.** A shortened version (questions 1, 2, 3, 4, 6) of The Pittsburgh Sleep Quality
7 Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989), was used to assess the
8 weekly sleep habits of participants. The PSQI was selected for a variety of reasons. First, it is
9 the most widely used sleep health assessment tool in both clinical and non-clinical
10 populations. Second, the PSQI is considered to be “possibly the most rigorously validated
11 tool used in sleep diagnostics” (Manzar et al., 2018). Finally, for the purposes of the current
12 study it is a cost effective tool that is easy for athletes to complete and was easy for us to
13 administrate. Responses were collected for difference between time spent in bed and time
14 actually sleeping in hours and minutes. Participants also rated their sleep quality during the
15 previous week using a scale of very good (vg), fairly good (fg), fairly bad (fb), and very bad
16 (vb). The PSQI is the most commonly used sleep quality measure in clinical and research
17 settings (Mollayeva et al., 2016) and can be shortened by reducing the number of questions
18 (e.g., Famodu, et al., 2018).

19 **Social Validation.** On-line questionnaires and semi-structured member checking
20 interviews were conducted at the end of the post-intervention time point to ascertain the
21 participants’ perceptions and feelings of the intervention. Social validation data can also
22 enhance researchers’ understanding of results and intervention efficacy (Page & Thelwell,
23 2013). Firstly, participants ($n = 4$) completed a 5-question self-report on-line questionnaire
24 consisting of open ($n = 2$) and closed ($n = 3$) questions concerning perceived usefulness of
25 the REBT sessions in relation to performance and wellbeing. Next, individual participant

1 member checking interviews were conducted and recorded to share data, explore credibility
2 of results, and ensure that participants' own meanings and perspectives were represented
3 (Birt, Scott, Cavers, Campbell, & Walter 2016; Tong, Sainsbury, & Craig, 2007).

4 **Intervention procedure**

5 The intervention was delivered by the first author who is a supervised trainee Sport
6 and Exercise Psychologist registered with the British Psychological Society (BPS) Division
7 of Sport and Exercise Psychology (DSEP) and accredited primary practitioner in REBT.
8 Participants were educated in REBT following guidelines from previous literature (Ellis &
9 Dryden, 1997; Turner & Barker, 2014) and attended five one to one sessions across the study,
10 ($M = 124.8$ days). All sessions were recorded using a voice recording App (Audio Memos).
11 Sessions were arranged on an individual basis, at a time and location convenient for the
12 participant, with the aim of sessions being held weekly. Sessions were designed to be
13 personal to the participant, going at their pace, supporting the idiosyncratic nature of the
14 study, and were guided by the REBT ABCDE framework. The frequency of sessions was
15 determined by participant need.

16 Broadly, the first session was designed to introduce the participant to the ABCDE
17 framework of REBT. The therapeutic process of REBT (Dryden & Branch, 2008)
18 encourages individuals to understand that when facing adversity (A) it is their beliefs (B)
19 about the adversity that directs their emotional and behavioural responses (C), not the
20 adversity alone. Here, participants practised using examples from their sporting histories to
21 establish the A-C connection, were introduced to the four types of irrational beliefs and
22 taught the B-C connection, the notion that the emotional problem is determined by beliefs at
23 B rather than adversity at A. Once this ABC framework was understood, subsequent sessions
24 focused on participants disputing or cognitively restructuring (D) their irrational beliefs and
25 replacing them with rational alternatives (E). Here participants were given specific scenarios

1 on cards, they practiced disputing the belief using taught questioning methods. Next,
2 participants were encouraged to develop and subsequently dispute rational beliefs using the
3 scenarios given.

4 Following recommendations (Turner & Barker, 2014), the practitioners and
5 participant collaboratively set homework (between sessions tasks) in order to help the
6 participant to develop their REBT comprehension and competence. For example, completion
7 of an ABC chart to establish A-C and B-C connection and identifying unhealthy negative
8 emotions (adapted from Ellis & Dryden, 1997). Here, participants identified their beliefs and
9 practiced using the ABCDE model independently. Participants 2 and 3 completed all
10 homework, whereas participants 1 and 4 were more inconsistent, particularly near the latter
11 stages of the study. If homework had not been completed by the participant, time in the next
12 session was dedicated to discussing the importance of homework, and these tasks were
13 completed during the session instead. After weekly sessions terminated, a month elapsed
14 before social validation member checking interviews took place. Each participant completed
15 on-line questionnaires and attended a member checking interview where visual representation
16 of their individual data was shared giving the opportunity to explore reflection on personal
17 experiences (Birt et al., 2016).

18 **Analytic Strategy**

19 Small changes in variables can lead to substantial differences for athletes in
20 idiographic case study designs (Barker, McCarthy, Jones, & Moran, 2011) therefore data was
21 tabulated (Table 2) for each participant and dependent variable, to determine whether
22 intervention effects had occurred (e.g., Neil et al., 2013). This approach was used due to the
23 exploratory nature of the study, in-line with similar studies (e.g., O'Connor, 2018) rather than
24 statistical significance of the intervention effects on participant data (Hrycaiko & Martin,
25 1996). Visual inspection was conducted for all monitored variables for each participant,

1 including all irrational beliefs (demandingness, awfulizing, low-frustration tolerance,
2 depreciation), the self-determination index, vitality, and sleep quality (see Table 2). This
3 inspection occurred across five separate time points; baseline, post-first session (after one
4 REBT session), midpoint (after 3 REBT sessions), post-final session (after five REBT
5 sessions) and follow-up (one-month post-intervention). The visual analysis of data included
6 four steps to determine intervention effectiveness; (a) immediacy of effect, (b) effects
7 replicated across participants, (c) overlapping data points between baseline and follow-up, (d)
8 magnitude of percentage change from baseline to follow-up phases (Hrycaiko & Martin,
9 1996). For clarity and to adhere to the idiographic nature of the study, results are structured
10 by participant rather than by variable (e.g., Thelwell & Greenlees, 2001).

11 **Results**

12 **Visual inspection**

13 **Participant 1.** Visual inspection revealed substantive reductions in irrational beliefs;
14 demandingness (-74.07%), awfulizing (-74.07%), low-frustration tolerance (-70.83%), and
15 depreciation (-53.33%) from baseline to follow-up phases. Also, increases were reported in
16 the self-determination index (156%), and vitality (200%) and sleep reported as '2hrs/vb'
17 post-first session to '0/vg' at follow-up.

18 Across all irrational beliefs there was an immediate increase from baseline to post-
19 first session. Thereafter, all variables decreased from post-first session to follow-up, with the
20 exception of PIB (mid-point to post-last session: 7.14%) and depreciation remained the same
21 (post-last session to follow-up). The self-determination index increased across all time points.
22 Vitality increased from baseline to midpoint, and then reduced at post-last session (-21.29%),
23 but then increased substantially to follow-up (105.48%). Sleep scores decreased for time
24 spent in bed and actual time sleeping and quality increased from 'vb' to 'vg' from post-first
25 session to follow-up phase. Finally, there were no overlapping data points from baseline to

1 follow-up across all variables. In sum, irrational beliefs decreased, the self-determination
2 index and subjective vitality increased substantially, and sleep quality improved over the data
3 collection phases.

4 **Participant 2.** Visual inspection revealed reductions in demandingness (-12.50%),
5 awfulizing (-14.81%), low-frustration tolerance (-18.52%), and depreciation (-34.62%) from
6 baseline to follow-up phases. Also, during this phase, increases were reported in the self-
7 determination index (46.15%), and vitality (16.75%) and sleep reported as '0/fg' post-first
8 session to '0/vg' at follow-up.

9 Across all irrational beliefs there was an immediate increase from baseline to post-
10 first session, with the exception of depreciation, which reduced (-11.54%). Thereafter, all
11 variables decreased from post-first session to midpoint, and all variables increased from post-
12 last session to follow-up. The self-determination index increased across all time points, with
13 the exception of midpoint to post-last session (-18.18%). Vitality increased from baseline to
14 post-first session (25%), reduced from post-first session to post-last session, then increased
15 substantially at follow-up (100.43%). Sleep scores decreased for time spent in bed and actual
16 time sleeping and quality increased from 'vb' to 'vg' from post-first session to follow-up
17 phase. Finally, there were no overlapping data points from baseline to follow-up across all
18 variables. In sum, participant 2 experienced decreases in irrational beliefs to post-last session,
19 then increases in all four irrational beliefs at follow-up, the self-determination index and
20 subjective vitality increased across the study period but decreased at post-last session. Sleep
21 improved over the data collection phases.

22 **Participant 3.** Visual inspection revealed immediate reductions in demandingness (-
23 46.88%), awfulizing (-61.54%), low-frustration tolerance (-58.62%), and depreciation (-
24 52.63%) from baseline to follow-up. Also, during this phase, increases were reported in the

1 self-determination index (8.57%), and vitality (8.58%) and sleep reported as '0/fg' post-first
2 session to '0/vg' at follow-up.

3 Across all irrational beliefs there were reductions in all variables apart from
4 awfulizing which increased (7.69%) and stabilization in depreciation (0%) from baseline to
5 post-first session. Thereafter, all variables decreased from post-first session to follow-up,
6 with the exception of awfulizing which increased from midpoint to post-last session (14.29%)
7 and stabilization in demandingness (midpoint to post-last session: 0%) and depreciation
8 (post-last session to follow-up (0%). The self-determination index decreased from baseline to
9 post-first session (-32.86%), increased at midpoint (14.89%) and follow-up (33.85%), and
10 remained stabilized at post-last session (0%). Vitality increased across all time points from
11 baseline to follow-up with the exception of a reduction at post-last session (-5.51%). Sleep
12 scores remained stable across all time points (0/fg-0/vg). Finally, there were no overlapping
13 data points from baseline to follow-up across variables. In sum, irrational beliefs decreased,
14 with the exception of awfulizing, across data collection phases. After an initial decrease at
15 post-first session, the self-determination index increased, and subjective vitality fluctuated
16 across the study period, whilst sleep improved.

17 **Participant 4.** Visual inspection revealed immediate reductions in demandingness (-
18 51.52%), awfulizing (-39.29%), low-frustration tolerance (-22.58%), and depreciation (-
19 33.33%) from baseline to follow-up. Also, during this phase, increases were reported in the
20 self-determination index (457.14%), and vitality (90.97%) and sleep reported as '-1hr/fg'
21 post-first session to '-2/vg' at follow-up.

22 Across all irrational beliefs there was an immediate decrease from baseline to post-
23 first session, but there was a small increase in depreciation post-first session (4.76%).
24 Thereafter, all variables decreased from post-first session to midpoint, increased from
25 midpoint to post-last session and all decreased again at follow-up. The self-determination

1 index increased across all time points, with the biggest increase from baseline to post-first
2 session (142.86%). Vitality increased across all time points from baseline to follow-up.
3 Finally, there were no overlapping data points from baseline to follow-up across all variables.
4 In sum, irrational beliefs decreased across the study period, and all four irrational beliefs
5 increased at post-last session. There were substantial increases in the self-determination index
6 and subjective vitality, and sleep improved over the data collection phases.

7 In sum, across all participants, irrational beliefs decreased over the data collection
8 phases. Although some phases show slight increases, the data is highly suggestive of a
9 downward trend in irrational belief scores from baseline to follow-up. The self-determination
10 index and vitality increased in all four participants across the study period with the most
11 noticeable increments in participants 1 and 4. Sleep quality improved in all four participants
12 from post-first session to follow-up.

13 **Social Validation**

14 Social validation on-line questionnaires and semi-structured member checking
15 interviews were administered. Member checking provides an interactive face-to-face method
16 that can provide a rich data set and the opportunity for transformation of meaning (Birt et al.,
17 2016). Member checking was used to validate, verify and assess the trustworthiness of the
18 results, giving participants the opportunity to check for accuracy and resonance with their
19 experiences. Here, participants reported that they had experienced changes in their thinking,
20 having established connections between rational beliefs and healthy emotions, reflecting the
21 content covered in the REBT intervention. For example, “I’m much more aware I’m doing
22 this [triathlon] for fun, and actually that’s enough” (Participant 3) and “well the thinking has
23 definitely changed, because you are applying something that you are taught – which is a
24 positive thing” (Participant 4). In addition, there was evidence of changes in modifying
25 irrational beliefs. Participant 1 commented “so I’ve been questioning the way things are

1 said...it was like yes, but you don't have to, you haven't got to do this, you want to, but you
2 haven't got to" and Participant 2 stated "I think further down the process...question myself,
3 are you sure? Is it really awful?" Participants also reported changes in behaviours "I do tend
4 to change the words, I think that's...one of the big key takeaways" (Participant 1) and "your
5 behaviour changes because you're not negative. You're positive – happier – and more
6 confident that you can do something or go further" (Participant 4). Changes in emotions were
7 also reported "I am enjoying it [triathlon] more" (Participant 3). Participants felt the REBT
8 intervention shifted their motivation. Participant 3 felt "a motivational change because I went
9 out to swim more," and Participant 2 stated "it comes down to confidence to bring back the
10 motivation if it goes," perhaps reflecting the enhanced ability to self-manage their
11 motivational state by questioning "why am I doing this?" Participant 4 reported, "I have got
12 something to focus on. I have improved. And, coupled with these sessions ...actually, I can
13 do this, and it's what I want to do."

14 All participants reported shifts in vitality in the self-report measures, but in member
15 checking, participant 3 said the sessions "didn't have any impact" on vitality and regarding
16 sleep "I don't think there's been a big change." However, participant 1 stated that the
17 sessions had "kind of helped boost energy...I wasn't being quite so stressed. I'm actually
18 able to sleep better." Participant 2 said "My confidence has changed the energy levels" and
19 "the sessions didn't help me sleep better or worse." Participant 4 remarked "It improves all
20 sorts of levels. It improves sleep. It improves what you can do." Broadly, member checking
21 allowed active involvement in the validation process and participants felt REBT had been a
22 positive experience, "it feels like a huge, valuable tool" (Participant 3) and "it's been a good
23 thing for me to be part of" (Participant 2). Finally, data from on-line questionnaires suggests
24 that the REBT intervention was useful to sport performance ($M = 4, SD = .82$) and to
25 wellbeing ($M = 4.5, SD = .58$).

1 All four participants commented positively on the intervention experience, with
2 almost no suggestions for improvements or constructive criticism. Participant 1 suggested an
3 improvement with the addition of written instructions for homework tasks, rather than just
4 verbal instructions to aid memory outside of sessions. Participant 3 stated that although the
5 ABC process was “helpful” and a “useful tool” the process was not “super intuitive” and was
6 not “the first thing I think of” when undesirable emotions arose.

7 **Discussion**

8 This study reports an explanatory idiographic single-case examination of the effects
9 of REBT on the self-determined motivation and psychological wellbeing (vitality and sleep)
10 of four amateur triathletes. The chief aim of the study was to build on the study by Turner
11 and Davis (2018) in a different sample of triathletes. It was hypothesised that REBT would
12 decrease irrational beliefs and increase the self-determined motivation of triathletes. In
13 addition, some authors have suggested that REBT might be an effective approach for
14 enhancing athlete psychological wellbeing (e.g., Wood, Turner, & Barker, 2019), and as
15 such, the current study examined the effects of REBT on subjective vitality and sleep quality,
16 all variables that could impact on training in the very demanding sport of triathlon (Bales,
17 Bales, Deakon, & Johnson, 2012). Methodologically, the current study adopted an
18 explanatory idiographic single-case design and included member checking in the social
19 validation data collection, a sparsely used method of evaluating intervention effects in sport
20 contexts (Culver, Gilbert, & Trudel, 2003).

21 Results from visual analyses of data indicate that REBT was effective in reducing
22 irrational beliefs, increasing self-determined motivation, vitality, and sleep quality, across all
23 four participants. The results are strengthened by adherence to inspection criteria used to
24 determine meaningful change (Hrycaiko & Martin, 1996) with findings supported by
25 quantitative, and qualitative (social validation) methods, collected one-month post-

1 intervention. REBT was effective for all four participants in reducing irrational beliefs in the
2 longer term at the follow-up phase. Data suggest that irrational beliefs decreased to a greater
3 extent from baseline to midpoint (after 3 REBT sessions), but then there was some
4 fluctuation in the data whereby Participant 1 continued to report decreases in irrational
5 beliefs, participants 2 and 3 reported increases and decreases in irrational beliefs and
6 Participant 4 reported increases in irrational beliefs. During this time period (midpoint to
7 post-last session) participants received two REBT sessions. Here, unlike for the first three
8 sessions, REBT sessions were not held weekly due to participant availability. These
9 fluctuations could therefore be triggered by erratic schedules of participants 3 and 4, who
10 experienced longer periods between sessions (13 days and 21 days respectively). In sum, in
11 line with past research REBT was shown to be effective in reducing irrational beliefs.

12 The present study also demonstrated changes in self-determined motivation
13 throughout and following REBT sessions, with all four participants reporting increases in the
14 self-determination index from baseline to follow-up. All four participants reported increases
15 in the self-determination index from baseline to post-first session, with the exception of
16 Participant 3 who reported a decrease. From post-first session to midpoint, participants
17 reported larger self-determination index increases than any other time in the study, with the
18 exception of Participant 3 who reported greater increases at follow-up. From midpoint to
19 follow-up, statistical analyses showed increases in the self-determination index for all four
20 participants. However, data revealed fluctuations by Participant 2, who experienced decreases
21 in the self-determination index at post-last session. Increments in self-determined motivation
22 are generally in line with decreases in irrational beliefs found in the current study. For
23 example, medium to large reductions in irrational beliefs from baseline to post-first session
24 were complimented by small to medium increases in the self-determination index across all
25 four participants. However, although all four participants experienced a reduction in irrational

1 beliefs at midpoint, whilst the self-determination index increased for participants 1 and 4 at
2 midpoint (after three REBT sessions) it did not change for Participant 3 and decreased for
3 Participant 2. Both participants 2 and 3 experienced fluctuations in irrational beliefs at post-
4 last session, with Participant 2 showing an increase in awfulizing and low-frustration
5 tolerance, and Participant 3 an increase in AWF. This suggests that for these two participants
6 at post-last session, the increases in irrational beliefs accompanied a decrease in self-
7 determination index scores. However, all four participants revealed increases in the self-
8 determination index at follow-up. Notably, in the follow-up phase athletes reported further
9 decreases in irrational beliefs, and increases in self-determination index scores, vitality, and
10 sleep quality. This is in line with some past research (e.g., Cunningham & Turner, 2016) and
11 may reflect the athletes' propensity to continue to implement REBT independently when the
12 intervention contact time has ceased. Indeed, this is an important goal of REBT, helping
13 athletes to self-manage emotions once they have been suitably trained to use REBT
14 independently and competently (Turner, 2016). Continuing to self-manage REBT could
15 specifically benefit triathletes, due to demanding training loads typical of endurance sports,
16 such as triathlon (Nixdorf, Frank, & Beckmann, 2016). All participants were selected prior to
17 the study due to their high irrational beliefs and low self-determined motivation scores,
18 therefore overall the data suggest that REBT triggered decreases in irrational beliefs and
19 increases in self-determined motivation in the hypothesised direction and in line with past
20 research (Turner & Davis, 2018). Due to the demanding nature and commitment of triathlon
21 training, (Bales et al., 2012), fostering self-determined motivation might contribute to
22 triathletes continuing in the sport due to more effective coping strategies (see Weiss &
23 Ambrose, 2008, for a review).

24 The findings in the current study that there are increases in the self-determination
25 index, alongside complimentary decreases in irrational beliefs, suggest that in all four

1 participants their motivation became more autonomous and less controlling. Motivation that
2 is more controlling reflects a sense of pressure and obligation to engage in an activity
3 (controlled motivation; Reeve, 2012). Irrational beliefs are synonymous with more
4 controlling motivation regulation, where motives to engage or achieve are driven by demands
5 and self-worth is contingent on success. One particular type of motivation that is particularly
6 salient with regards to irrational beliefs is introjected regulation (Turner, 2016). In introjected
7 regulation the source of motivation is from a pressurised, internal voice driven by guilt, worry
8 or shame to enact in behaviour (Ryan & Deci, 2002) not because an individual wants to, but
9 out of self-imposed obligation (“I must”). This feeling of engaging in an activity because one
10 “should” parallels language of “should” and “must” in REBT literature (Ellis & Dryden,
11 1997). In the current study, as irrational beliefs were challenged and attenuated during REBT,
12 simultaneously there was a rise in self-determined motivation suggesting that REBT is
13 effective in shifting motivation regulation to what is considered to be a more autonomous and
14 beneficial motivation (Teixeira, Carraca, Markland, Silva & Ryan, 2012). This was supported
15 in social validation data, for example, with participant 3 stating that “I’m doing it for myself,
16 that’s a relief of pressure.”

17 Alongside increases in self-determined motivation, the current study also found
18 complimentary increases in vitality and sleep quality. All four participants reported
19 improvements in subjective vitality and sleep across the study period. With the exception of
20 Participant 4, three participants reported decreases in subjective vitality at post-last session.
21 This pattern of decreases in subjective vitality for participants 1, 2 and 3 are combined with
22 complimentary increases in irrational beliefs at post-last session, suggesting a potential
23 relationship between the two constructs. In contrast Participant 4, who reported increments
24 in subjective vitality, reported no increases in irrational beliefs at post-last session. This study
25 presents an important contribution to the exploration of REBT on the psychological

1 wellbeing of triathletes, as there is scant evidence of reported shifts in irrational beliefs and
2 wellbeing outcomes in the literature.

3 Irrational beliefs are associated with a vast range of emotional and behavioural
4 outcomes that undermine psychological wellbeing (Visla et al., 2016). But sparse empirical
5 studies to date have directly examined the relationship between irrational beliefs and
6 psychological wellbeing outcomes in athletes. Therefore, the current study presents REBT as
7 a potentially effective approach for promoting athlete psychological wellbeing. Research
8 examining the effects of REBT on vitality are scarce, but research suggests that REBT can
9 facilitate psychological health (Wood, Barker, Turner, & Sheffield, 2018). There is a dearth
10 of literature exploring the wellbeing of triathletes (Vleck, Millet, & Alves, 2014), therefore
11 the reported effects in the current study offer some promising avenues for further research.
12 Based on data from the current study, during REBT (sessions 1-3) self-reported vitality
13 increased in all four participants, however when participants 1, 2 and 3 reported fluctuations
14 in irrational beliefs, complimentary decreases in vitality occurred or remained the same,
15 suggesting that as a result of increases in irrational beliefs, vitality was affected.

16 The reported sleep quality improvements were also supported by social validation
17 data, with Participant 3 stating “I wasn't being quite so stressed, I'm actually able to sleep
18 better” and participant 4 reporting he is “more positive and confident, because you're not
19 beating yourself up...I'm doing well.”. Research has consistently demonstrated presence of
20 dysfunctional cognitions when experiencing difficulties initiating sleep, specifically
21 catastrophising (e.g., Noone et al., 2013; Hiller, Lovato, Gradisar, Oliver, & Slater, 2014)
22 which has relevance to REBT. Unhelpful or maladaptive beliefs about sleep involve thoughts
23 that are rigid and involve unrealistic expectations (Carney et al, 2010). All participants
24 learned to dispute dysfunctional thinking, supporting assertions from Cognitive Behaviour
25 Therapy literature that challenging dysfunctional thinking is effective for sleep disturbances

1 (Bryson, Read, Bush, & Edwards, 2015). All participants reported improvements in sleep
2 across the study, with participant 3 stating “my sleep has probably changed...because I’m
3 maybe not stressing about things.” Sleep is recognised as an essential component for athlete
4 preparation and suggested to be the single best recovery strategy to an athlete (Halsen, 2013),
5 important for the sport of triathlon which consists of three sporting disciplines.

6 Limitations within this study may help to guide future research. First, the findings
7 would be strengthened with a cross-sectional approach using correlational and longitudinal
8 methods, to give a fuller understanding of the causal relationships between irrational beliefs,
9 self-determined motivation, and wellbeing markers. Specifically, a further exploration of how
10 irrational beliefs interact with specific types of motivation regulation would provide a clearer
11 understanding of how REBT and OIT may integrate. Secondly, whilst the idiographic method
12 used in the current study can be considered a strength due to its individuality and robustness,
13 single-case guidelines suggest 8-weeks of baseline data be collected (e.g., Barker, McCarthy,
14 Jones, & Moran, 2011). Participants could not accommodate such a lengthy baseline phase
15 alongside a planned REBT intervention due to significant burden on time this would pose. In
16 addition, to strengthen the study design, nuanced fluctuations in target variables during the
17 interview could be explored more closely using open ended questions throughout the
18 intervention period as has been used in past research (e.g., Neil et al., 2013). More in-depth
19 questioning may have also allowed us to gain a greater understanding about mechanisms of
20 change reported by participants. Notably, social validation revealed almost no criticism of the
21 intervention, which might be a result of bias, and or the kinds of questions used in member
22 checking. Future research should endeavour to more meaningfully gauge the opinions of
23 participants in receipt of REBT in order to form valuable insights into intervention delivery,
24 efficacy, and veracity. A good example of how constructive criticism could be approached in
25 applied research can be seen in the recent work of Latinjak, Hernando-Gimeno, Lorido-

1 Méndez, and Hardy (2019). But more broadly, much of the extant REBT research draws on
2 single-case designs, and future research should concentrate on the use of more experimental
3 designs such as those including control groups (e.g., Turner, Slater, & Barker, 2015) and
4 randomised control trials (e.g., Stefan, Cristea, Szentagotai-Tatar, & David 2019).

5 To conclude, the present study contributes to the extant literature by providing an
6 explanatory idiographic single-case examination of REBT on the self-determined motivation,
7 vitality, and sleep quality of four amateur triathletes. This study supports the effectiveness of
8 REBT with athletes and extends the existing research by replicating the finding that REBT
9 can influence motivation (Turner & Davis, 2018). Data indicated that REBT was successful
10 in reducing irrational beliefs, augmenting self-determined motivation, vitality, and sleep
11 quality. It is hoped that this study will encourage further research into the relationships
12 between irrational beliefs, motivation, and athlete wellbeing.

13 **References**

- 14 Bales, J., Bales, K., Deakon, R., & Johnson, D. (2012) The triathlon tips from the top:
15 practical tips for racing and training for a triathlon. *Sports Medicine and*
16 *Arthroscopy Review*, 20, 237-238.
- 17 Barker, J. B., McCarthy, P. J., Jones, M. V., & Moran, A. (2011). *Single-case research*
18 *methods in sport and exercise psychology*. London: Routledge.
- 19 Barker, J. B., Mellalieu, S. D., McCarthy, P. J., Jones, M. V., & Moran, A. (2013). Special
20 Issue on Single-Case Research in Sport Psychology. *Journal of Applied Sport*
21 *Psychology*, 25(1), 1-3. doi:10.1080/10413200.2012.729378
- 22 Barlow, D. H., & Nock, M.K., (2009) Why Can't We Be More Idiographic in Our Research?
23 *Perspectives on Psychological Science* 4(1), 19-21.
- 24 Barlow, D. H., Nock, M. K., Hersen, M. (2008). *Single case experimental designs: Strategies*
25 *for studying behavior change* (3rd ed.). Boston: Allyn & Bacon.

- 1 Birt, L., Scott S., Cavers D., Campbell, C., & Walter, F. (2016). Member checking: A tool to
2 enhance trustworthiness or merely nod to validation? *Qualitative Health Research*
3 26(13), 1802-1811.
- 4 Bostic, T. J., Rubio, D. M., & Hood, M. (2000). A validation of the subjective vitality
5 scale using structural equation modelling. *Social Indicators Research*, 52, 313-
6 324
- 7 British Triathlon, (2018) Statistics. Retrieved from:
8 <https://www.britishtriathlon.org/media/statistics>
- 9 Bryson, W. J., Read, J. B., Bush, J. P., & Edwards, C. L. (2015). The need for an integrated
10 cognitive-behavioural model for co-occurring chronic pain and insomnia. *Journal of*
11 *Rational-Emotive & Cognitive-Behavioural Therapy*, 33(3), 239-257
- 12 Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., Kupfer, D. J., (1989). The
13 Pittsburgh Sleep Quality Index (PSQI): A new instrument for psychiatric research
14 and practice. *Psychiatry Research*, 28, 193-213.
- 15 Carney, C. E., Edinger, J. D., Morin, C. M., Manber, R., Rybarczyk, B., Stepanski, E. J.,
16 Wright, H., & Lack L. (2010). Examining maladaptive beliefs about sleep across
17 insomnia patient groups. *Journal of Psychosomatic Research*, 68(1), 57-65.
- 18 Chen, C. (2006). Improving work-life balance: REBT for workaholic treatment (pp.
19 310–330). In: Burke RJ, (Ed.). *Research companion to working time and work*
20 *addiction*. Cheltenham: Edward Elgar.
- 21 Culver, D. M., Gilbert, W. D., & Trudel, P. (2003) A decade of Qualitative Research in
22 Sport Psychology Journals: 1990-1999. *The Sport Psychologist*, 17, 1-15.
- 23 Cunningham, R., & Turner, M. J. (2016). Using Rational Emotive Behavior Therapy
24 (REBT) with Mixed Martial Arts (MMA) athletes to reduce irrational beliefs and

- 1 increase unconditional self-acceptance. *Journal of Rational-Emotive & Cognitive-*
2 *Behavior Therapy*. 34(4), 289-309
- 3 David, D., Lynn, S., & Ellis, A. (2010). *Rational and irrational beliefs. Implications*
4 *for research, theory, and practice*. New York, NY: Oxford University Press
- 5 Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in*
6 *human behavior*. New York, NY: Plenum Publishing Corporation.
- 7 Deci, E. L., & Ryan, R. M. (2008). Facilitating Optimal Motivation and Psychological
8 Well-Being Across Life Domains. *Canadian Psychology*, 49(1), 14-23
- 9 Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and
10 the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268.
- 11 Dolan, S. H., Houston, M., & Martin, S. B. (2011). Survey results of the training,
12 nutrition, and mental preparation of triathletes: Practical implications of findings.
13 *Journal of Sports Sciences*, 29(10), 1019–1028.
- 14 Dodge, R., Daly, A., Huyton, J., & Sanders, L. (2012). The challenge of defining
15 wellbeing. *International Journal of Wellbeing*, 2(3), 222-235.
16 doi:10.5502/ijw.v2i3.4
- 17 Dryden, W., & Branch, R. (2008). *The fundamentals of rational-emotive behavior*
18 *therapy*. West Sussex, UK: Wiley.
- 19 Ellis, A. (1957). Rational psychotherapy and individual psychology. *Journal of*
20 *Individual Psychology*, 13, 38–44.
- 21 Ellis, A., & Dryden, W. (1997). *The practice of rational-emotive behavior therapy*.
22 New York, NY: Springer Publishing Company.
- 23 Famodu, O. A., Barr, M. L., Holaskova, I., Zhou, W., Morrell, J. S., Colby, S. E. &
24 Olfert, M.D. (2018). Shortening of the Pittsburgh Sleep Quality Index survey
25 using factor analysis. *Sleep Disorders*, <https://doi.org/10.1155/2018/9643937>

- 1 Furst, D., Ferr, T., & Megginson, N. (1993). Motivation of disabled athletes to
2 participate in triathlons. *Psychological Reports, 72*, 403–406.
- 3 Gagné, M., Ryan, R. M., & Bargmann, K. (2003). Autonomy support and need
4 satisfaction in the motivation and well-being of gymnasts. *Journal of Applied*
5 *Social Psychology, 30*, 1843–1852.
- 6 Galli, N., & Vealey, R. S. (2008). “Bouncing back” from adversity: Athletes’
7 experiences of resilience. *Sport Psychologist, 22*, 316–335.
- 8 Gillet, N., Berjot, S., & Gobance, L. (2009). A motivational model of performance in
9 the sport domain. *European Journal of Sport Science, 9*(3), 151–158.
- 10 Gillet, N., Vallerand, R. J., Amoura, S., & Baldes, B. (2010). Influence of coaches’
11 autonomy support on athletes’ motivation and sport performance: A test of the
12 hierarchical model of intrinsic and extrinsic motivation. *Psychology of Sport and*
13 *Exercise, 11*, 155–161. doi:10.1016/j.psychsport.2009.10.004
- 14 Gillison, F., Osborn, M., Standage, M., & Skevington, S. (2009). Exploring the
15 experience of introjected regulation for exercise across gender in adolescence.
16 *Psychology of Sport and Exercise, 10*, 309-319. doi:
17 10.1016/j.psychsport.2008.10.004.
- 18 Grand’Maison, K. (2004). What mental skills Ironman triathletes need and want.
19 *Journal of Excellence, 10*, 86–94.
- 20 Halson, S.L. (2013). Sleep and the elite athlete. *Sports Science, 26*(113) 1-4.
- 21 Hill, A. P., Curran, T., Hall, H. K., & Appleton, P. R. (2011). Passion and burnout in
22 elite junior soccer players: The mediating role of self-determined motivation.
23 *Psychology of Sport and Exercise, 12*(6), 655–661.

- 1 Hiller, R.M., Lovato, N., Gradisar, M, Oliver, M., & Slater, A. (2014). Trying to fall
2 asleep while catastrophising: what sleep disordered adolescents think and feel.
3 *Sleep Medicine, 15*(1), 96-103
- 4 Hrycaiko, D., & Martin, G. L. (1996). Applied research studies with single-subject
5 designs: Why so few? *Journal of Applied Sport Psychology, 8*, 183-199
- 6 Kawabata, M., Yamazai, F., Guo, D. W., & Chatzisarantis, N. L. D. (2017).
7 *Scandinavian Journal of Medicine & Science in Sports, 27*,1793-1800
- 8 Lamont, M., & Kennelly, M. (2012). A qualitative exploration of participant motives
9 among committed amateur triathletes. *Leisure Sciences, 34*(3), 236–255.
- 10 Latinjak, A. T., Hernando-Gimeno, C., Lorido-Méndez, L., & Hardy, J. (2019).
11 Endorsement and Constructive Criticism of an Innovative Online Reflexive Self-
12 Talk Intervention. *Frontiers in psychology, 10*, 1819.
13 doi:10.3389/fpsyg.2019.01819
- 14 Laursen, P. B. (2011). Long distance triathlon: Demands, preparation and performance.
15 *Journal of Human Sport and Exercise, 6*, 247–263 doi:10.4100/jhse.2011.62.05
- 16 Lopez-Fernandez, I., Merino-Marban, R., & Fernandez-Rodriguez, E. (2014)
17 Examining the Relationship Between Sex and Motivation in Triathletes.
18 *Perceptual & Motor Skills: Exercise & Sport, 119*(1), 42-49
- 19 Lyon, A.R., Connors, E., Jensen-Doss, A., Landes, S., Lewis, C.C., McCleod, B. D.,
20 Rutt, C., Stanick, C. & Weiner, B.J. (2017) intentional research design in
21 implementation science: implications for the use of nomothetic and idiographic
22 assessment. *Behavioural Medicine. 7*(3) 567-580.
- 23 Mallett, C., & Hanrahan, S. (2004). Elite athletes: Why does the fire burn so brightly?
24 *Psychology of Sport and Exercise, 5*, 183–200.

- 1 Manzar, M. D., BaHammam, A. S., Hameed, U. A., Spence, D. W., Pandi-Perumal, S.
2 R., Moscovitch, A., & Streiner, D. L. (2018). Dimensionality of the Pittsburgh
3 Sleep Quality Index: a systematic review. *Health and quality of life outcomes*,
4 16(1), 89. doi:10.1186/s12955-018-0915-x
- 5 Martens, R. (2007). Science, knowledge, and sport psychology. In D. Smith & M. Bar-
6 Eli (Eds.), *Essential readings in sport and exercise psychology* (pp. 457-470).
7 Human Kinetics: USA.
- 8 Meredith, S. J., Dicks, M., Noel, B., & Wagstaff, C. R. D., (2018). A review of
9 behavioural measures and research methodology in sport and exercise
10 psychology. *International Review of Sport and Exercise Psychology*, 11(1), 25-
11 26.
- 12 Mollayeva, T., Thurairajah, P., Burton, K., Mollayeva, S., Shaprio, C.M., &
13 Colantonio, A. (2016) The Pittsburgh sleep quality index as a screening tool for
14 sleep dysfunction in clinical and non-clinical samples: A systematic review and
15 meta-analysis. *Sleep Medicine Reviews*, 25, 52-73
- 16 Nadler, S. F., Steiner, D. J., Erasala, G. T., Hengehold, D. A., Abeln, S. B. &
17 Weingand, K.W. (2003). Overnight use of continuous low level heatwrap
18 therapy for relief of low back pain, *Archives of Physical Medicine and Rehabilitation*,
19 84: 335-342.
- 20 Neil, R., Hanton, S., & Mellalieu, S. D. (2013). Seeing things in a different light:
21 Assessing the effects of a cognitive-behavioral intervention upon the further
22 appraisals and performance of golfers. *Journal of Applied Sport Psychology*,
23 25(1), 106-130.
- 24 Newman, C. J. (2014). Using REBT in the treatment of restless leg syndrome: A case-
25 study. *Journal of Rational-Emotive Cognitive-Behavioral Therapy*, 32, 139.

- 1 <https://doi.org/10.1007/s10942-013-0174-z>
- 2 Nixdorf, I., Frank, R., & Beckmann, J. (2016). Comparison of athletes' proneness to
3 depressive symptoms in individual and team Sports: Research on psychological
4 mediators in junior elite athletes. *Frontiers in Psychology, 17*(7), 893.
- 5 Noone, D. M., Willis, T.A., Cox, J., Harkness, F., Ogilvie, F. E., Sterr, A., & Gregory,
6 A.M., (2013). Catastrophising and poor sleep quality in early adolescent females.
7 *Journal of Behavioural Sleep Medicine, 11*, 1-12
- 8 Normand, M.P., (2016) Less Is More: Psychologists Can Learn More by Studying
9 Fewer People. *Frontiers in Psychology*. Retrieved from:
10 <https://www.frontiersin.org/articles/10.3389/fpsyg.2016.00934/full>
- 11 O'Connor, H. (2018). Anxiety, unhealthy jealousy, and exercise avoidance: a Rational
12 Emotive Behaviour Therapy (REBT) intervention. In M. Turner, & R. Bennett
13 (Eds.), *Rational Emotive Behaviour Therapy in Sport and Exercise* (pp 38-53).
14 Abingdon, Oxon: Routledge Psychology of Sport, Exercise and Physical Activity
- 15 Page, J., & Thelwell, R. (2013). The value of social validation in single-case methods
16 in sport and exercise psychology. *Journal of Applied Sport Psychology, 25*(1),
17 61–71. doi:10.1080/10413200.2012.663859
- 18 Pelletier, L. G., Rocchi, M. A., Vallerand, R. J., Deci, E. L., & Ryan, R. M.
19 (2013). Validation of the revised sport motivation scale (SMS-II). *Psychology of*
20 *Sport and Exercise, 14*(3), 329-341
- 21 Rakovic, A., Herodek, K, & Mladenovic, D. (2012). Twenty-week preparation period
22 of triathlons. *Activities in Physical Education & Sport, 2*(2), 241-247
- 23 Reeve, J. (2012). Editorial. *Motivation and Emotion, 36*, 101-102

- 1 Ryan, R.M. (2009) Self-determination Theory and Wellbeing. Wellbeing in Developing
2 Countries (WeD). Available at: [http://www.welldev.org.uk/wed-
4 new/network/researchreview/Review_1_Ryan.pdf](http://www.welldev.org.uk/wed-
3 new/network/researchreview/Review_1_Ryan.pdf) (accessed 10 June 2019)
- 4 Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization:
5 examining reasons for acting in two domains. *Journal of Personal Social
6 Psychology, 57*, 746–761.
- 7 Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: classic
8 definitions and new directions. *Contemporary Educational Psychology, 25*, 54–
9 56.
- 10 Ryan, R. M., & Deci, E. L. (2002). On assimilating identities to the self: as elf-
11 determination theory perspective on internalization and integrity within cultures.
12 In M. R. Learly, & J. P. Tangey (Eds.), *Handbook of self and identity* (pp. 255-
13 273). New York: Guilford.
- 14 Ryan, R. M., & Deci, E. L. (2008). From ego-depletion to vitality: theory and findings
15 concerning the facilitation of energy available to the self. *Social Personality
16 Psychologist Compass, 2*, 702-717.
- 17 Ryan, R. M., & Frederick, C. (1997) On energy, personality, and health: subjective
18 vitality as a dynamic reaction of well-being. *Journal of Personality, 65*, 529-565.
- 19 Sarrazin, P., Vallerand, R. J., Guillet, E., Pelletier, L. G., & Curry, F. (2002).
20 Motivation and dropout in female handball players: A 21-month prospective
21 study. *Journal of Social Psychology, 32*, 395– 418.
- 22 Schickler, P. (2005). Achieving health or achieving wellbeing? *Learning in Health and
23 Social Care, 4*, 217-227. doi:[10.1111/j.1473-6861.2005.00100.x](https://doi.org/10.1111/j.1473-6861.2005.00100.x)

- 1 Snape, J. (2018). How to Train For a Triathlon. Retrieved from:
2 [https://www.coachmag.co.uk/exercises/sport-workouts/2064/triathlon-training-](https://www.coachmag.co.uk/exercises/sport-workouts/2064/triathlon-training-tips)
3 [tips](https://www.coachmag.co.uk/exercises/sport-workouts/2064/triathlon-training-tips)
- 4 Stefan, S., Cristea, I. A., Szentagotai-Tatar, A., & David, D. (2019). Cognitive-behavioral
5 therapy (CBT) for generalized anxiety disorder: Contrasting various CBT approaches
6 in a randomized clinical trial. *Journal of Clinical Psychology, 75*(7), 1188-1202. doi:
7 10.1002/jclp.22779.
- 8 Szentagotai-Tatar, A., Candea, D-M., & David, D. O. (2019). The Modern Study of Well-
9 Being: Positive Psychology. In M. E. Bernard & W. Dryden (Eds.), *Advances in*
10 *REBT. Theory, Practice, Research, Measurement, Prevention and Promotion.* (pp.
11 247-266)
- 12 Teixeira, P.J., Carraca, E.V., Markland, D., Silva, M. N., & Ryan, R. M. (2012)
13 Exercise, Physical activity, and self-determination theory: A systematic review.
14 *International Journal of Behavioral Nutrition and Physical Activity, 9*, 78
- 15 Thelwell, R. C., & Greenlees, I. A. (2001). The effects of a mental skills training
16 package on gymnasium triathlon performance. *The Sport Psychologist, 15*, 127–
17 141.
- 18 Tenenbaum, G., Eklund, R. C., & Kamata, A. (2012). Introduction to measurement in
19 sport and exercise psychology. In G. Tenenbaum, R. C. Eklund, & A. Kamata
20 (Eds.), *Measurement in sport and exercise psychology* (pp. 3-8). USA: Human
21 Kinetics.
- 22 Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting
23 qualitative research (COREQ): A 32-item checklist for interviews and focus
24 groups. *International Journal for Quality in Health Care, 19*, 349-357.

- 1 Turner, M. J., & Barker, J. B. (2014). Using rational emotive behaviour therapy with
2 athletes. *The Sport Psychologist*, 28(1), 75–75. doi:10.1123/tsp.2013-0012
- 3 Turner, M. J., & Moore, M. (2016). Irrational beliefs predict increased emotional and
4 physical exhaustion in Gaelic football athletes. *International Journal of Sport*
5 *Psychology*. 47, (2), 187-199.
- 6 Turner, M. J. (2016). Rational emotive behaviour therapy (REBT), irrational and
7 rational beliefs, and the mental health of athletes. *Frontiers in Psychology*, 7,
8 1423. doi:10.3389/fpsyg.2016.01423
- 9 Turner, M. J. (2019). REBT in Sport. In, M.E. Bernard & W. Dryden (Eds.), *Advancing*
10 *REBT Theory, Research and Practice*. New York: Springer.
- 11 Turner, M. J., Allen, M., Slater, M. J., Barker, J. B., Woodcock, C., Harwood, C. G., &
12 McFadyen, K. (2018). The development and initial validation of the irrational
13 performance beliefs inventory (iPBI). *European Journal of Psychological*
14 *Assessment*, 34, 174-180. doi:10.1027/1015-5759/a000314
- 15 Turner, M. J., & Allen, M. (2018). Confirmatory factor analysis of the irrational
16 Performance Beliefs Turner, M. J., & Bennett, R. (2018) Rational Emotive
17 Behaviour Therapy in Sport and Exercise. Routledge.
- 18 Turner, M. J., Aspin, G., & Gillman, J. (2019). Maladaptive schema as a potential
19 mechanism through which irrational beliefs relate to psychological distress in
20 athletes. *Psychology of Sport & Exercise*, 44, 9-16.
21 <https://doi.org/10.1016/j.psychsport.2019.04.015>
- 22 Turner, M. J., & Bennett, R. (2018). Rational Emotive Behaviour Therapy in Sport and
23 Exercise. Routledge.

- 1 Turner, M. J., & Davis, H. S. (2018) Exploring the Effects of Rational Emotive
2 Behaviour Therapy on the Irrational Beliefs and Self-Determined Motivation of
3 Triathletes, *Journal of Applied Sport Psychology* (in press)
- 4 Turner, M. J., Carrington, S., & Miller, A. (2018b). Psychological distress across sport
5 participation groups: The mediating effects of secondary irrational beliefs on the
6 relationship between primary irrational beliefs and symptoms of anxiety, anger,
7 and depression. *Journal of Clinical Sport Psychology*. Advance online
8 publication.
- 9 Turner, M. J., Slater, M. J., & Barker, J. B. (2015). The season-long effects of rational
10 emotive behavior therapy on the irrational beliefs of professional academy soccer
11 athletes. *International Journal of Sport Psychology*, 5, 429-451.
- 12 Van Wijhe, C., Peeters, M., & Schaufeli, W. (2013). Irrational beliefs at work and
13 implications for workaholism. *Journal of Occupational Rehabilitation*, 23(3),
14 336–346.
- 15 Vallerand, R. J. (2001). A hierarchical model of intrinsic and extrinsic motivation in
16 sport and exercise. In G. C. Roberts (Ed.), *Advances in motivation in sport and*
17 *exercise* (pp. 263–320). Champaign, IL: Human Kinetics.
- 18 Viciano, J., Mayorga-Vega, D., Guijarro-Romero, S. & Martínez-Baena, A., & Blanco,
19 H. (2017) The Spanish adaptation of the Sport Motivation Scale-II in adolescent
20 athletes. *Psychological Reports*, 120(5), 943-965
- 21 Visla, A., Fluckiger, C., Grosse Holtforth, M., & David, D. (2015). Irrational beliefs
22 and psychological distress: A Meta-analysis. *Psychotherapy and Psychosomatics*,
23 85, 8-15
- 24 Vleck, V., Millet, G.P., & Alves, F.B. (2014). The Impact of Triathlon Training and
25 Racing on Athletes' General Health. *Sports Medicine*, 44(12) 1659-1692.

- 1 Voight, M. (2012). A leadership development intervention program: A case study with
2 two elite teams. *The Sport Psychologist*, 26(4), 604-623.
- 3 Waddel-Smith, A. (2010). A qualitative analysis of motivation of elite female
4 triathletes. Retrieved from: doi:[http://scholarworks.sjsu.edu/cgi/viewcontent.cgi?](http://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=4826&context=etd_theses)
5 [article=4826&context=etd_theses](http://scholarworks.sjsu.edu/cgi/viewcontent.cgi?article=4826&context=etd_theses)
- 6 Weiss, M. R., & Ambrose, A. J. (2008). Motivational orientations and sport behavior.
7 In T. S. Horn (Ed.), *Advances in sport psychology* (3rd ed., pp. 115–155).
8 Champaign, IL, US: Human Kinetics.
- 9 Willig, C. (2013). *Introducing qualitative research in psychology* (3rd ed.).
10 Maidenhead: Open University Press.
- 11 Wood, A. G., Barker, J. B., Turner, M., & Sheffield, D. (2018). Examining the effects
12 of rational emotive behavior therapy (REBT) on performance outcomes in elite
13 Paralympic athletes. *Scandinavian Journal of Medicine & Science in Sports*, 28
14 (1), 329-339. doi: 10.1111/sms.12926
- 15 Wood, A. G., Turner, M. J., & Barker, J. B. (2019). Bolstering Psychological Health Using
16 Rational Emotive Behaviour Therapy. In G. Breslin., and G. Leavey (Eds.). *Mental*
17 *health and well-being interventions in sport: A case study analysis*. Routledge.
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1 Table 1. REBT day number, mean, total time and session number across the study period.

Participant	Day number through study period						Mean session length	Total REBT time	Follow up day	ASE	Total numbe of sessions
	Baseline	REBT 1	REBT 2	REBT 3	REBT 4	REBT 5					
1	0	32	39	46	53	65	37.27	3.06.38	123	2	5 7
2	0	32	39	46	53	63	40.26	3.31.28	121	1	5 8
3	0	35	42	52	65	70	45.39	3.26.31	133	0	5 9
4	0	39	46	53	60	67	49.27	4.06.34	122	0	5 10

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12 *Note.* Total REBT time = Total length of REBT sessions in hours, minutes, seconds; ASE = additional support emails.

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- 1 Table 2. Means (Standard Deviations) and percentage change for irrational beliefs, self-determined motivation, subjective vitality and sleep
 2 quality across time points.

Measure	Participant	Baseline	Post-first session	Midpoint	Post-last session	Follow up	Baseline to Post-last % change
Demandingness	1	27	28 (3.70) ^a	14 (-50) ^b	15 (7.14) ^c	7 (-53.33) ^d	-44.44
	2	32	33 (3.13) ^a	27 (-18.18) ^b	26 (-3.70) ^c	28 (7.69) ^d	-18.75
	3	32	31 (-3.13) ^a	24 (-22.58) ^b	24 (0) ^c	17 (-29.17) ^d	-25.00
	4	33	28 (-16.39) ^a	20 (-28.57) ^b	24 (20) ^c	16 (-33.33) ^d	-27.27
Awfulizing	1	27	33 (22.22) ^a	10 (-69.70) ^b	9 (-10) ^c	7 (-22.22) ^d	-66.67
	2	27	29 (7.41) ^a	18 (-37.93) ^b	21 (16.67) ^c	23 (9.52) ^d	-28.57
	3	26	28 (7.69) ^a	14 (-50) ^b	16 (14.29) ^c	10 (-37.50) ^d	-62.50
	4	28	25 (-10.71) ^a	15 (-40) ^b	21 (40) ^c	17 (-19.05) ^d	-25.00
LFT	1	24	27 (12.5) ^a	9 (-66.67) ^b	8 (-1.11) ^c	7 (-12.50) ^d	-66.67
	2	27	29 (7.41) ^a	16 (-44.83) ^b	20 (25) ^c	22 (10) ^d	-25.93
	3	29	26 (-10.34) ^a	20 (-23.08) ^b	16 (-20) ^c	12 (-25) ^d	-44.83
	4	31	28 (-9.68) ^a	17(-39.29) ^b	27 (58.82) ^c	24 (-11.11) ^d	-12.90
Depreciation	1	15	20 (33.33) ^a	11 (-45) ^b	7 (-36.36) ^c	7 (0) ^d	-53.33
	2	26	23 (-11.54) ^a	21 (-8.70) ^b	14 (-23.33) ^c	17 (21.43) ^d	-52.63
	3	19	19 (0) ^a	16 (-15.79) ^b	9 (-43.75) ^c	9 (0) ^d	-52.63
	4	21	22 (4.76) ^a	15 (-31.82) ^b	19 (26.67) ^c	14 (-26.32) ^d	-9.52
SDI	1	25	44 (76) ^a	54 (22.73) ^b	63 (16.67) ^c	64 (1.57) ^d	152
	2	39	46 (17.95) ^a	66 (43.48) ^b	54 (-18.18) ^c	57 (5.40) ^d	38.46
	3	70	47 (-32.86) ^a	54 (14.89) ^b	54 (0) ^c	76 (33.85) ^d	-22.86

REBT AND SELF-DETERMINED MOTIVATION

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	4	14	34 (142.86) ^a	63 (85.29) ^b	71 (12.70) ^c	78 (9.40) ^d	407.14
SVS	1	2	3.58 (79) ^a	3.71 (3.63) ^b	2.92 (-21.29) ^c	6.00 (105.48) ^d	46
	2	4	5 (25) ^a	3.17 (-36.6) ^b	2.33 (-26.50) ^c	4.67 (100.43) ^d	-41.75
	3	5.00	5.50 (-5.66) ^a	6.17 (12.18) ^b	5.83 (-5.51) ^c	6.33 (8.58) ^d	16.60
	4	2.88	3.17 (10.07) ^a	4.50 (41.96) ^b	5.33 (18.44) ^c	5.50 (3.19) ^d	85.07
Sleep quality	1	/	-2hrs/vb	-10mins/fg	-15mins/vg	-0/vg	/
	2	/	0/fg	0/vg	0/fg	0/vg	/
	3	/	0/fg	0/fg	0/fg	0/vg	/
	4	/	-1hr/fg	-30mins/fg	-1hr/fg	-2/vg	/

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2 *Note.* ^aBaseline to Post first session % change, ^bPost-first session to midpoint % change, ^cmidpoint to Post-last session % change, ^dPost last
 3 session to Follow up % change.

4 LFT = low frustration tolerance; SDI = Self Determination Index, SVS = Subjective Vitality Questionnaire. Response set for sleep questionnaire
 5 is difference between time spent in bed and time actually sleeping in minutes/hours (mins/hr), ratings for sleep quality: vg = very good, fg =
 6 fairly good, vb = very bad.

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