Teeing up for success: The effects of rational and irrational self-talk on the putting performance of amateur golfers.

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Abstract

The investigation of rational emotive behaviour therapy (REBT) in sport settings is growing, but controlled experimental field studies are sparse. In the limited extant literature, researchers have found that irrational (extreme, rigid, and illogical) self-talk leads to disrupted motor skill performance, compared to rational (non-extreme, flexible, and logical) self-talk. However, methodological limitations of past research and the absence of sport-relevant tasks limit the application of findings to athletic settings. Therefore, the current study examined the effects of rational and irrational self-talk on the pressured putting performance of amateur golfers, by adopting a controlled and field-based experimental study design. A two-way repeated-measures ANCOVA, controlling for baseline putting ability, revealed that golfers' putting accuracy was significantly better when using rational self-talk than when using irrational self-talk. In addition, one-samples and paired-samples *t*-tests showed that golfers reported that rational self-talk was more usable than the irrational self-talk, and perceived the rational self-talk to be more facilitative than the irrational self-talk for their putting performance. The results are discussed with reference to potential explanatory mechanisms, study limitations, and future research needs.

Keywords: CBT; self-statements; golf; experiment; beliefs.

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Rational emotive behaviour therapy (REBT) is a cognitive-behavioural psychotherapeutic (CBT) approach introduced by Albert Ellis in the 1950's (Ellis, 1957). In REBT, an individual's emotional and behavioural responses (C) to events (A) are dependent on rational and irrational beliefs (B) about the event. This ABC framework is used therapeutically to help athlete's understand that irrational beliefs drive unhealthy negative emotions and maladaptive behaviours, whilst rational beliefs drive healthy negative emotions and adaptive behaviours (Turner & Barker, 2014). Irrational beliefs are characterised as extreme, rigid, and illogical, and rational beliefs are non-extreme, flexible, and logical. Athletes are then encouraged to abandon their irrational beliefs in favour contextualof rational beliefs (Ellis & Dryden, 1997).

The effectiveness of REBT for psychological health is well documented (David, Cotet, Matu, Mogoase, & Stefan, 2017) and the deleterious effects irrational beliefs for wellbeing and mental health is well supported (see Turner, 2016 for a review). Because irrational beliefs are associated with unhealthy negative emotions (e.g., anxiety, depression, rage) and consequent maladaptive behaviours (i.e., avoidance or escape-based behaviours), they are proposed to hinder goal attainment (Dryden & Branch, 2008). In contrast, because rational beliefs are associated with healthy negative emotions (e.g., concern, sadness) and consequent adaptive behaviours (i.e., approach or assertive behaviours), they are proposed to aid goal attainment (Dryden & Branch, 2008). But whilst the detrimental effects of irrational and rational beliefs on wellbeing and mental health are evident in literature, much less is known about the effects of irrational and rational beliefs on human performance, especially in sport (Turner, 2016).

Performance contexts such as elite sport are inherent with stressors (e.g., organisational, competitive, and personal; Weston, Thelwell, Bonds, & Hutchings, 2009), and those who operate in such settings with rational beliefs are more likely to evidence psychological health and goal achievement (Turner, 2016). Researchers have reported the promising application of REBT across a variety of sports (e.g., soccer, archery, mixed-martial artists, squash). Studies have reported changes in emotional outcomes (e.g., reduced performance anxiety; Turner & Barker, 2013), psychological constructs indicative of enhance performance (e.g., enhanced self-efficacy, perceived control, resilience, Deen, Turner, & Wong, 2017; Wood, Barker, & Turner, 2017a), physiological markers (e.g., reduced baseline Systolic Blood Pressure; Wood, Barker, Turner, & Sheffield, 2018) and objective markers of performance (e.g., Wood et al., 2017a) following REBT.

But in the face of the promising findings that rational beliefs are beneficial for goal attainment, caution should be exercised in assuming that irrational and rational beliefs can influence acute motor performance (Turner, 2016). The evidence that rational beliefs enhance skilled motor performance is sparse and methodologically limited, relying on social validation data (e.g., Turner & Barker, 2013) and abstract performance tasks unrelated to the sporting environment (e.g., Bonadies & Bass, 1984). Limitations aside, one promising way in which researchers have tried to understand how irrational and rational beliefs may influence motor performance is by operationalizing beliefs through self-talk. In his only contribution to the sport and exercise psychology literature, Ellis (1994) outlined that REBT can be used to develop rational coping self-statements to aid sport and exercise participation. Ellis (1994) suggests writing the statements down, and thinking about them several times a day, and an example he uses is, "I'd very much prefer to be great at sports, but if I'm

not, I can still enjoy playing and never put myself down for losing" (p. 254). Therefore, the application of REBT principle via self-talk is not a new idea, but unfortunately has engendered scant research.

In some of the limited extant research irrational and rational beliefs are used to form self-talk statements that help create rational self-talk (or self-statement) and irrational self-talk (or self-statement) conditions. Findings suggest that irrational self-talk leads to significantly more errors and reduced behavioural efficiency in a mirror-tracing task (Bonadies & Bass, 1984; Schill, Monroe, Evans, & Ramanaiah, 1978), and increased anxiety and reduced performance during a series of trail making tasks (Kombos, Fournet, & Estes, 1989). In contrast, the adoption of irrational compared to rational self-talk prior to and during an insolvable puzzle led to greater self-report anxiety, but no effects on task persistence (Rosin & Nelson, 1983). However, previous studies used imagined rather than real-life stressors, failed to include control groups (e.g., Bonadies & Bass, 1984), and used leading self-statements about performance effects (i.e., statements would help/hinder performance; Schill et al., 1978). In addition, the early studies recounted here do not use athletic tasks or recruit skilled performers, and therefore tell the reader little about the effects of irrational and rational self-talk on sports performance.

The effects of self-talk strategies on sporting performance have been studied extensively, reporting positive moderate effects sizes (ES = .48; Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011). Amongst numerous variations of self-talk (e.g., instructional, ironic processing, motivational) one popular categorisation is the positive vs. negative valence, whereby positive self-talk equates to successful performances and negative self-talk leads to the contrary. However, in a systematic

review of the self-talk literature (Tod, Hardy & Oliver, 2011), it appears that whilst positive self-talk is associated with successful outcomes, negative self-talk was unrelated to performance. Accordingly, researchers have alluded to the importance of self-talk function over valence (i.e., positive vs. negative), indicating negative self-talk can help or hinder performance depending on individual differences, culture, and context (Weinberg, 2018). This is salient because according to REBT theory when encountered with adversity, irrational/rational beliefs (i.e., irrational & rational self-talk), emotions and behaviours are not defined in terms of valence, but instead functionality, that is 'how helpful is what you are telling yourself in reaching your respective goal?' (Hyland & Bdouszek, 2012). As such, the examination of irrational and rational self-talk, that is the intellectual insight of core beliefs offers a novel and valuable contribution to further explore the functional effects of self-talk on sporting performance.

Overcoming many of the limitations of past research, Wood, Turner, Barker, and Higgins (2017b) examined the effects of irrational and rational self-talk on golf putting. Based in the laboratory, the study showed that novice golfers performed no better when using rational self-talk than when using irrational self-talk. In addition, findings reported no differences in the motivational qualities of irrational or rational self-talk, as assessed by task persistence whilst tolerating discomfort. Although offering greater methodological rigour (e.g., competitive task scenario, controlling for baseline scores, objective markers of performance), the use of self-statements within an experimental setting reflects low ecological validity and the use of an unskilled sample makes it difficult to generalise the study findings to athletes. In sum, the motor performance implications of rational and irrational self-talk in sport remains unclear with past research offering contrasting findings. Some research shows that

irrational self-talk hinders motor performance (e.g., Bonadies & Bass, 1984), whilst research employing more robust research methods has found no effects (e.g., Wood et al., 2017b).

Gaining a greater understanding of whether and what extent rational and irrational beliefs influence athletic performance is important so that athletes, and practitioners who work with athletes, can be better informed about which beliefs to hold and endorse, or indeed abandon, in the pursuit of performance excellence. The current study aims to examine the performance effects of rational and irrational self-talk in golfers, addressing the shortcomings of past research in four main ways. First, the current study adopts a blinded repeated-measures crossover design to mitigate individual differences that may emerge through between-groups designs. Second, in line with the sport-specific model of self-talk (Van Raalte, Vincent, & Brewer, 2016), which posits that personal factors (e.g., skill level) and contextual factors (e.g., competitive environments) are related to self-talk and performance, the current study recruited competitive golfers to perform pressured golf-putting to ensure task engagement and reduce learning effects. Third, aligned with REBT theory this study examines the functional categorisation of irrational (i.e., dysfunctional) and rational (i.e., functional) self-talk on sporting performance. Finally, the current study employs field-based data collection rather than laboratory data collection to enhance the ecological validity of the study. Based on past research, it is hypothesised that rational self-talk will lead to greater golf putting performance from baseline compared to irrational self-talk. It is also hypothesised that rational self-talk will be perceived as more useful and more facilitative for golf putting performance than irrational self-talk.

Method

Participants

Fifty-seven amateur golfers (*M*age = 30.63, *SD* = 11.85; *M*handicap = 13.25, *SD* = 7.27, range: 0-28; Females = 17) were recruited from a golf club in the West Midlands, United Kingdom. Participants volunteered to take part after seeing an advertisement for the study on the golf club notice board. No inducement was offered for taking part, and all participants completed informed consent prior to any data collection. The study was approved by a University ethics committee prior to participant recruitment.

Experimental Design

In this study a within-subjects cross-over design was used, where all participants completed golf putting performances in baseline, rational self-talk, and irrational self-talk conditions. Specifically, participants completed baseline golf putting performance first (session 1), and then were randomly allocated to either rational self-talk or irrational self-talk conditions (session 2). Then, participants returned to complete the putting performance in the alternate condition (session 3). Participants self-selected which self-talk condition they experienced in sessions 2 and 3 by selecting one of two sealed envelopes at the end of session 1. One envelope contained rational self-talk instructions, and the other contained irrational self-talk instructions. The contents of each envelope were unknown to the experimenter until all data had been collected.

The development of the rational and irrational self-talk (see Figure 1) was undertaken by REBT-trained (primary practicum) sport and exercise psychology practitioners. All eight self-talk statements were closely aligned to contemporary REBT theory. The four rational self-talk statements reflected the four core rational

beliefs of REBT (preferences, anti-awfulizing, high frustration tolerance, self-acceptance), and the four irrational self-talk statements reflected the four core irrational beliefs of REBT (demandingness, awfulizing, low frustration tolerance, depreciation). The rational and irrational statements contained the same contextual information (e.g., sink the putt, succeed, failing) to make sure that the statements were comparable, with the only differences between rational and irrational self-talk being the expression of rational or irrational beliefs.

Sessions were 1-week apart and all sessions occurred at the same time of the week. A pre-self-talk baseline measure was deemed the most reliable way to obtain pre-manipulation putting performance because it was not possible to withdraw the self-talk once it had been administered. This baseline measure was important to determine the performance effects of rational and irrational self-talk over and above usual performance.

Measures

Golf putting performance. To measure golf putting performance, a pressured golf-putting task was developed for this study. Based on past research (Fearing et al., 2011), a seven-foot (2.13-meter) length putt was used for the golf-putting task. This was because research encompassing Professional Golf Association (PGA) putting statistics suggests that the likelihood of making a seven foot putt is 50% (Fearing et al., 2011). The putting task took place on a putting green at the golf club, offering a more ecologically valid assessment of golf putting compared to laboratory-based putting tasks used in some past research (e.g., Wood et al., 2017b). However, as environmental conditions cannot be controlled in the field, but can affect golf putting success, the speed of the green was measured before each session using a stimpmeter

(e.g., Mathers & Grealy, 2013). Data collection only commenced if the stimpmeter reading was between 7 and 12. At each of the three sessions (baseline, rational self-talk, and irrational self-talk) each participant completed 15 performance putts that were recorded by the experimenter. Participants putted from the same place on the green for each putt, and number of successful putts was used as the performance score in the present study, such that a higher score indicated better putting performance. The putting task was made pressured by engendering ego threat in line with past research (Wilson, Wood, & Vine, 2009). This involved informing participants that each week for the next three weeks they were competing with all other participants in the study on the golf-putting task, and that their score would be visible on a league table in the club. Pilot testing utilised 25 performance putts, but pilot participants (n = 5) indicated to the experimenter that this was too many and that they lost interest, and that 15 would be more appropriate. Prior to putting performance data collection in each session, participants completed 6 familiarisation putts on the green so that performance scores more accurately reflected performance rather than learning or warm-up effects.

Self-talk usability. Following each self-talk session (sessions 2 and 3), participants were asked to indicate the usability of the self-talk they had used in the session on a Likert-scale from 0% (*not usable at all*) to 100% (*extremely usable*). This item was used to assess the applicability of the rational and irrational self-talk for the participants in the putting task.

Self-talk performance facilitation. Following each self-talk session (sessions 2 and 3), participants were asked to indicate the extent to which the self-talk they had used in the session was helpful for their putting performance on a Likert-scale from 0% (*not helpful at all*) to 100% (*extremely helpful*). This item was used to assess the

perceived performance-facilitating effects of the rational and irrational self-talk in the putting task.

Procedure

Participants who contacted the experimenter in responses to the study advertisement at the club were invited to read the information form about the study, and complete a consent form if they wished to take part. After consent had been confirmed, participants completed a short questionnaire comprising some demographic questions (age, sex, handicap). The participant was then invited to session 1 at a mutually agreed time convenient for them to attend for three consecutive weeks (session the three sessions).

In line with a similar study (e.g., Wood et al., 2017b) participants attended individually on three separate occasions. First, completing a baseline condition (A; no self-statements), then completing irrational (B) and rational (C) self-talk conditions in a randomised order. In session 1, participants were instructed that each week for the next three weeks they were competing with all other participants in the study on a golf-putting task, and that their score would be visible on a league table in the club. This was to increase ego threat in the golf-putting task. Participants were invited to ask any questions they may have, and then completed 6 familiarisation putts, after which the experimenter emphasised to the participant that the next fifteen putts would be measured and used for the competition this week. After the fifteen performance putts, the participant was reminded about their second session, and were asked to select one of two envelopes labelled “1” and “2”. The experimenter was blinded to the content of each envelope but recorded their selection so that in the next session the participant would use the contents of their selected envelope as their self-talk. One

envelope contained rational self-talk instructions, and the other envelope contained irrational self-talk instructions.

In session 2, participants were reminded of the competitive nature of the golf-putting task, and completed 6 practice putts as in session 1. Then, prior to the 15 performance putts, participants were given their previously selected envelope and asked to read the statements on the paper inside. The researcher walked away from the participant and asked the participant to return the paper into the envelope after 5-minutes had elapsed. The experimenter then instructed to participant to think about the instructions they had read and to practice the self-talk for a further 5-minutes. The standardised 5-minute to reading (5-minutes) and rehearsal (5-minutes) periods was used in the current study to provide participants with sufficient time to read and learn the self-talk. We did not want to create an extended time lag between familiarisation putts and performance putts as we wanted to avoid any negation of the familiarisation putts. The participants were instructed to use this self-talk in the 15 performance putts that would be used in the competition this week. As in session 1, the number of successful putts was recorded. In addition, between each putt the experimenter reminded the participant to use the self-talk. Following the 15 performance putts, participants completed the self-talk usability and performance facilitation questions, and on completion of this were asked to seal their answers in an envelope provided by the experimenter. This was to blind the experimenter from the perceptions of the participants until after all data had been collected for the study. Finally in session 2, participants were reminded about session 3 the following week.

In session 3, participants completed the same protocol as in session 2, but received the alternate self-talk. That is, if they received the rational self-talk in session 2, they received the irrational self-talk in session 3, and visa versa. The experimenter

was blinded to the content of the envelopes but recorded the envelope selection (1 or 2) for data analyses purposes after all study data had been collected. Finally, participants were fully verbally debriefed as to the purpose of the study (Howitt & Cramer, 2011), and were given an opportunity to withdraw their data and or ask any questions.

Analytic Strategy

Prior to main analyses, data were tested for significant outliers using Shapiro Wilks tests. Following past research and recommendations (e.g., Salkind, 2010), significant outliers of >/< 2 SDs were Windsorised[i]. There were no missing data. Main analyses were completed in three stages. First, one-samples and paired-samples *t*-tests (including Cohen's *d* effect sizes; Cohen, 1988) were completed for self-talk usability and performance facilitation data. This was to examine differences in usability and perceived performance facilitation across the rational self-talk and irrational self-talk conditions. Second, a two-way repeated-measures ANCOVA was conducted with condition (rational and irrational) and order (time 1 and time 2) as within-subjects factors, to examine the differences in golf putting performance across rational self-talk and irrational self-talk conditions, and across participants first and second putting performances regardless of condition. Baseline golf-putting performance was entered into the analysis as a covariate to account for the potential confounding effects of participants' baseline putting scores on within-subjects differences. Finally, two paired samples t-tests were conducted to compare the putting scores of the rational and irrational self-talk conditions to baseline. Also, to aid descriptive clarity, change in golf putting performance was calculated from baseline for both the rational self-talk and irrational self-talk conditions, and transformed into percentage change variables (putting score change from baseline ÷ baseline × 100).

Results

Self-talk usability

A one-samples *t*-test revealed that participants reported that both the rational, $M = 62.02$, $SD = 26.00$, $t(56) = 18.07$, $p < .001$, and irrational, $M = 53.16$, $SD = 31.26$, $t(56) = 12.83$, $p < .001$, self-talk were usable for their performance. A paired-samples *t*-test revealed that participants reported higher usability, $t(56) = 2.22$, $p = .03$, $d = .31$, for the rational self-talk than the irrational self-talk (*Mdifference* = 8.86, $SD = 30.07$). In brief, participants felt that the rational self-talk was more usable than the irrational self-talk.

Self-talk facilitation

A one-samples *t*-test revealed that participants reported that both the rational, $M = 66.67$, $SD = 19.00$, $t(56) = 26.49$, $p < .001$, and irrational, $M = 50.17$, $SD = 26.76$, $t(56) = 14.16$, $p < .001$, self-talk were helpful for their performance. A paired-samples t-test revealed that participants reported higher putting facilitation, $t(56) = 4.38$, $p < .001$, $d = .71$, for the rational self-talk than the irrational self-talk (*Mdifference* = 16.49, $SD = 28.38$). In brief, participants felt that the rational self-talk was more helpful for their putting performance than the irrational self-talk.

Golf putting score across conditions

A two-way repeated-measures ANCOVA, with baseline putting performance serving as the covariate, revealed a significant main effect for self-talk condition, $F(1,55) = 10.94$, $p = .002$, $h_p^2 = .17$. Post-hoc pairwise comparisons revealed that golf putting scores were greater ($h_p^2 = .25$) in the rational self-talk condition ($M = 4.53$, $SD = 1.75$) than in the irrational self-talk condition ($M = 3.61$, $SD = 1.91$). There was no statistically significant effect for order, $F(1,55) = 1.98$, $p = .165$, $h_p^2 = .04$, and no

statistically significant self-talk X order interaction, F (1,55) = .32, p = .573, h_p^2 = .01.

Performance change from baseline

A paired samples *t*-test revealed that golfers putted significantly better after using rational self-talk (M = 4.53, SD = 1.75) than they did at baseline (M = 3.32, SD = 1.59), t(56) = 5.42, p < .001. After using irrational self-talk (M = 3.61, SD = 1.91) golf putting performance did not differ significantly from baseline, t(56) = 1.12, p = .27. To aid descriptive clarity, on average participants recorded a 66% (SD = 100%) increase in putting scores from baseline when using rational self-talk, and a 33% (SD = 112%) increase in putting scores from baseline when using irrational self-talk.

Discussion

The purpose of this study was to examine the performance effects of rational and irrational self-talk on the putting accuracy of amateur golfers, addressing the shortcomings of past research in three main ways. The extant literature concerning the performance effects of rational and irrational self-talk is contradictory, some research demonstrating that irrational self-talk hinders motor performance (e.g., Bonadies & Bass, 1984), and research employing more robust research methods reported no effects (e.g., Wood et al., 2017b). Past research literature has employed laboratory tasks and has recruited unskilled performers, limiting the applicability of the findings to actual sports performance. Therefore, the present study adopted a field-based protocol and recruited skilled performers, as well as utilising a blinded repeated measures crossover design to maintain experimental rigour. It was hypothesised that rational self-talk would lead to greater golf putting performance scores than irrational self-talk and baseline levels. It was also hypothesised that rational self-talk would be

perceived as more useful and more facilitative for golf putting performance than irrational self-talk.

In support of the first hypothesis, results indicate that when participants used rational self-talk, they scored more highly in the pressured golf putting task than when they used irrational self-talk, controlling for baseline levels. The finding that participants reported enhanced performance when adopting rational compared to irrational self-talk aligns closely with previous research (e.g., Bonadies & Bass, 1984; Kombos et al., 1989; Schill et al., 1978). Also, in line with the sport-specific model of self-talk (Van Raalte et al., 2016), when using irrational self-talk participants may have perceived some dissonance between the self-talk they had been asked to use and the self-talk they would typically use. That is, there may have been perceived conflict between the self-talk that feels natural in the moment, and the irrational self-talk. For example, some research (Wood et al., 2009) has shown that that using self-talk that conflicts with ones more deeply held cognitions can be detrimental to performance when compared with the use of self-talk that corresponds to more deeply held cognitions. Therefore, in the current study the irrational self-talk may have been perceived as less congruent with the participants usual self-talk when putting, compared to the rational self-talk. Based upon the findings of the current study there are various potential and inter-related mechanisms that could explain these performance differences.

First, data showed that rational self-talk was perceived to be more usable and more helpful for their performance in the task. As such, we could surmise that participants were more likely to engage with rational self-talk statements prior to the task because they perceived rational self-talk as more useful, and consequently, performance was facilitated due to a positive self-fulfilling prophecy (Rosenthan &

Jacobson, 1968). Second, previous researchers (e.g., Wood, Jordet, & Wilson, 2015) have suggested, and some researchers (e.g., Dixon, Turner, & Gillman, 2016) have found, positive associations between irrational beliefs and threat cognitive appraisals in relation to motivated performance situation. To explain, those with a rational view may be less likely to make a threat appraisals due to a realistic perspective of success and failure (i.e., "underperforming would be bad but certainly not the end of the world") and less likely to condemn themselves wholly for a behaviour (i.e., "I cannot be rated wholly as a failure for underperforming in a single instance"). This is important because threat, as opposed to challenge, is related to poorer athletic performance across a range of sports (e.g., Turner & Barker, 2013), including golf (Moore et al., 2012).

Third, and according to binary theory of emotion, rational beliefs generate healthy negative emotions (i.e., concern) lower in intensity compared to irrational beliefs that lead to unhealthy negative emotions (i.e., anxiety), higher in intensity that hinder goal achievement compared to the former (Dryden & Branch, 2008; Hyland & Bdouszek, 2012). As such, researchers have experimentally demonstrated those adopting irrational beliefs report greater increases in anxiety compared to those who adopt rational beliefs (e.g., Harris, Davies, & Dryden, 2006). There are many studies that postulate and show how heightened anxiety may disrupt the execution of motor skill performance. One prominent theory is the conscious processing hypothesis (CPH; Masters, 1992), which suggests that when under heightened anxiety performers are more likely to reinvesting explicit skill knowledge in an attempt to maintain and control the movement. In skilled performers, conscious processing occurring in times of high anxiety may disrupt skill motor performance (Mullen, Hardy, & Oldman, 2007). In brief, we could hypothesise that the adoption of irrational self-talk led to

reduced task performance by generating the unhealthy negative emotion of anxiety, engendering greater conscious processing of the skills, compared to rational self-talk and baseline. Clearly, without kinematic data or data concerning conscious processing or anxiety, this hypothesis is conjecture and should be examined in future research.

The present findings extend current understanding into the effects of self-talk from a functional (e.g., functional vs. dysfunctional) rather than valence (i.e., positive vs. negative) categorisation. In addition, this study challenges the most recent and methodological rigorous examination into the effects of irrational and rational self-talk on performance by Wood et al (2017b) whereby data reported no differences in performance and the associated outcomes (e.g., anxiety, performance efficiency). To explain, the use of a laboratory based setting and novice golfers though by Wood et al. (2017b) may have failed to imitate a real-life and meaningful scenario that is proposed to be fundamental when triggering irrational beliefs and the associated effects (Ellis, 1994). Instead, the present study used real-life and competitive golf-putting performance task in situ with amateur golfers, thus fostering a meaningful and ecologically valid task.

Further, there are some methodological limitations in the current study that if addressed could strengthen the findings. For example, future research should attempt to recruit a sex-balanced sample, given that in the current study 70% of the participants are male. This is important for two main reasons. First, research investigating REBT in sport has demonstrated that females report greater irrational beliefs than males (e.g., Turner, Carrington, & Miller, 2018; Turner & Allen, 2018) and therefore the effects of irrational beliefs on irrational and rational self-talk effects may be different in males than in females. Second, there is a sex-imbalance with the sport of golf, with only 15% of golf club members being female (England Golf,

2016). The current sample includes a higher proportion of female golfers than is reflected in the general population, but equal numbers would be ideal for more detailed comparisons.

Although the current study very specifically examined the effects of rational and irrational *self-talk* on golf putting performance, this study does not examine rational and irrational *beliefs*. That is, self-talk is not the same as belief, and whilst self-talk is considered to be effective for cognitive control, it is not necessarily reflective of deeply held beliefs (Zinsser, Bunker, & Williams, 2006). Given that self-talk may or may not reflect deeply held cognitions, it is unlikely that in the current study the experimental manipulation altered participants' core beliefs. Therefore future research should conduct Randomised Control Trials that systematically apply REBT to golfers to examine changes in performance as a result of changing in irrational beliefs to rational beliefs.

Further, although prior to putting performance self-talk was reinforced to participants, we did not measure frequency of self-talk usage (Hardy, 2006) or the believability of the self-talk. That is, participants may have been using the self-talk more or less frequently depending on personal preference, and have not believed the self-talk statements, and this may have influenced the results. The failure in the current study to discern the believability of the self-statements is in line with previous research on rational and irrational self-talk (e.g., Rosin & Nelson, 1983) and clearly should be addressed in future research. In addition, one limitation inherent in the study of self-talk is the inaccessibility of self-talk. In other words, we don't know for sure what participants were saying to themselves during golf putting performance. In the present study, we gave participants 15-minutes to overtly engage with and rehearse the self-talk statement, and then before each putt participants were prompted

to use the self-talk they had been given. However, ultimately we don't know whether and to what extent the self-talk was used, and even if we asked participants about their self-talk usage, we still would have no objective information on this matter. Perhaps think aloud methodologies could be incorporated into future research to partially mitigate this inherent limitation (e.g., Nicholls & Polman, 2008).

Finally, the current study demonstrates performance effects of rational and irrational self-talk using a performance outcome indicator of successful (holed) putts. However, no data was collected on the mechanisms that may provide a causal link between rational and irrational self-talk and putting accuracy. In other words, from the current data it is not known why performance differences emerged. REBT suggests that rational beliefs generate functional emotions, whilst irrational beliefs generate dysfunctional emotions (Ellis & DiGiuseppe, 1993), and therefore, future research should measure emotional outcomes in response to rational and irrational self-talk. Also, research should go one step further and try to understand the implications of such functional and dysfunctional emotional reactions on the movement kinematics of golf putting under pressure. It could be hypothesised that irrational self-talk causes anxiety (Turner & Barker, 2013) that increases conscious processing (Masters, 1992), thus influencing putting kinematics and consequently interrupting skill execution (e.g., Toner & Moran, 2011).

Based on the findings of the current paper, limitations notwithstanding, there are some practical implications that can be garnered. First, golfers might consider becoming more aware of their pre-shot self-talk and could consider using rational self-talk as part of their pre-shot routine in training and in competition. Further research is required, but golfers could consider viewing their self-talk not as positively or negatively valenced, but instead try to determine whether the self-talk is

functional or dysfunctional for performance. Indeed, some rational self-talk could be erroneously construed as 'negative' because it includes thoughts about failure (e.g., "I really would not want to failure, but that does not mean I must not, and it certainly would not be terrible") but could be functional for performance nonetheless due its flexibility. Ideally, golfers wishing to fully explore the application of rational self-talk could also engage in REBT with a sport and exercise psychologist. In REBT the athlete engages in a structured process through which core irrational beliefs are discouraged and core rational beliefs are promoted (see Turner & Bennett, 2018), thus going beyond self-talk.

In conclusion, the purpose of this study was to examine the performance effects of rational and irrational self-talk on the putting accuracy of amateur golfers. Results showed that participants were more accurate when using rational self-talk, compared to irrational self-talk, from baseline levels. The current research addressed the shortcomings of past research by employing more robust research methods (repeated measures crossover design) in a field-based data collection, and by recruiting skilled performers. Researchers should explore the potential mechanisms for greater golf putting accuracy when using rational self-talk, and examine interventions using REBT to enhance athletic performance.

References

Bonadies, G. A., & Bass, B. A. (1984). Effects of self-verbalizations upon emotional arousal and performance: A test of rational-emotive theory. *Perceptual and Motor Skills*, *59*, 939–948. doi:10.2466/pms.1984.59.3.939

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. Routledge.

David, D., Cotet, C., Matu, S., Mogoase, C., & Stefan, S. (2017). 50 years of rational-emotive and cognitive-behavioral therapy: A systematic review and meta-analysis. *Journal of Clinical Psychology*. 1-15.

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*, 249-263. doi:10.1123/tsp.2016-0057

Dixon, M., Turner, M. J., & Gillman, J. (2016). Examining the relationships between challenge and threat cognitive appraisals and coaching behaviours in football coaches. *Journal of Sports Sciences*, *35*, 2446-2452.

Dryden, W., & Branch, R. (2008). *The fundamentals of rational-emotive behavior therapy*. West Sus- sex, United Kingdom: Wiley.

Ellis, A. (1957). Rational psychotherapy and individual psychology. *Journal of Individual Psychology*, *13*, 38–44.

Ellis, A. (1994). Reason and emotion in psychotherapy (rev. ed.). Secaucus, NJ: Birch Lane.

Ellis, A., & DiGiuseppe, R. (1993). Are inappropriate or dysfunctional feelings in rational- emotive therapy qualitative or quantitative? *Cognitive Therapy and Research, 17*, 471-477.

Ellis, A., & Dryden, W. (1997). *The practice of rational emotive behavior therapy* (2nd ed.). New York, NY: Springer.

England Golf (2018, 26 April). *Women & girls*. Accessed on 24th April 2018, from https://statistics.laerd.com/spss-tutorials/ancova-using-spss-statistics.php

Fearing, D., Acimovic, J., & Graves, S. C. (2011). How to catch a Tiger: Understanding putting performance on the PGA Tour. *Journal of Quantitative Analysis in Sports*, *7*, 1-48.

Hardy, J. (2006). Speaking clearly: A critical review of the self-talk literature. *Psychology of Sport and Exercise, 7*, 81-97. doi:10.1016/j.psychsport.2005.04.002

Harris, S., Davies, M. F., & Dryden, W. (2006). An experimental test of a core REBT hypothesis: Evidence that irrational beliefs lead to physiological as well as psychological arousal. *Journal of Rational Emotive & Cognitive Behavior Therapy*, *24*, 101-111.

Hatzigeorgiadis, A., Zourbanos, N., Galanis, E., & Theodorakis, Y. (2011). Self-talk and sports performance: A meta-analysis. *Perspectives on Psychological Science*, *6*, 348-356.

Hyland, P., & Boduszek, D. (2012). A unitary or binary model of emotions: A discussion on a fundamental difference between cognitive therapy and rational emotive behavior therapy. *Journal of Humanistics and Social Sciences*, *1*, 49–61.

Kombos, N. A., Fournet, G. P., & Estes, R. E. (1989). Effects of irrationality on a trail making performance task. *Perceptual and Motor Skills, 68*, 591– 598. doi:10.2466/pms.1989.68.2.591

Mathers, J. F., & Grealy, M. A. (2013). Motor control strategies and the effects of fatigue on golf putting performance. *Frontiers in Psychology*, *4*, 1005. http://doi.org/10.3389/fpsyg.2013.01005

Masters, R. S. (1992). Knowledge, knerves and know how: The role of explicit versus implicit knowledge in the breakdown of a complex motor skill under pressure. *British Journal of Psychology*, *83*, 343–358.

Moore, L.J., Vine, S.J., Wilson, M.R., & Freeman, P. (2012). The effect of challenge and threat states on performance: An examination of potential mechanisms. *Psychophysiology*, *49*, 1417-1425. doi:10.1111/j.1469-8986.2012.01449.x.

Mullen, R., Hardy, L., & Oldham, A. (2007). Implicit and explicit control of motor actions: Revisiting some early evidence. *The British Journal of Psychology*, *98*, 141–156.

Nicholls, A. R., & Polman, R. C. (2008). Think aloud: acute stress and coping strategies during golf performances. *Anxiety Stress Coping*, *21*, 283–294.

Rosenthal, R., & Jacobson, L. (1968). *Pygmalion in the classroom: Teacher expectation and pupils' intellectual development.* New York, NY: Holt, Rinehart & Winston.

Rosin, L., & Nelson, W. M., III. (1983). The effects of rational and irrational self-verbalizations on performance efficiency and levels of anxiety. *Journal of Clinical Psychology, 39*, 208–213. doi:10.1002/1097-4679(198303)39:2?208::AID- JCLP2270390210?3.0.CO;2-S

Salkind, N. J. (2010). *Encyclopedia of research design*. Thousand Oaks, Calif: SAGE Publications.

Schill, T., Monroe, S., Evans, R., & Ramanaiah, N. (1978). The effects of self-verbalizations on performance: A test of the rational-emotive position. *Psychotherapy: Theory, Research & Practice, 15*, 2-7. doi: 10.1037/h0085835

Tod, D., Hardy, J., & Oliver, E. (2011). Effects of self-talk: A systematic review. *Journal of Sport and Exercise Psychology*, *33*, 666–687. doi:10.1123/jsep.33.5.666

Toner, J., & Moran, A. (2011). The effects of conscious processing on golf putting proficiency and kinematics. *Journal of Sport Sciences*, *29*, (7), 673–683.

Turner, M. J. (2016). Rational Emotive behavior therapy (REBT), irrational and rational beliefs, and the mental health of athletes. *Frontiers in Psychology, 7*, 1423. http://dx.doi.org/10.3389/fpsyg.2016 .01423

Turner. M. J., & Allen, M. (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. doi: 10.1016/j.psychsport.2017.11.017

Turner, M. J., & 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*, 131–147. doi: 10.1080/ 10413200.2011.574311

Turner, M. J., & Barker, J. B. (2014). Using rational emotive behavior therapy with athletes. *Sport Psychologist*, *28*, 75-90. doi:10.1123/tsp.2013-0012

Turner, M. J., & Bennett, R. (2018). Rational Emotive Behaviour Therapy in Sport and Exercise. Routledge.

Turner, M. J., Carrington, S., & Miller, A. (in press). 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*, accepted 25th August, 2017

Turner, M. J., Slater, M. J., Dixon, J., & Miller, A. (2018). Test–retest reliability of the irrational performance beliefs inventory. *European Journal of Sport Science*, *18*, 123-129.

Van Raalte, J. L, Vincent, A., & Brewer, B. W. (2016). Self-talk: Review and sport-specific model. *Psychology of Sport and Exercise*, *22*, 139–148

Weinberg, R. (2018). Self-Talk Theory, Research, Applications: Some Personal Reflections. *The Sport Psychologist, 32*, 74-78.

Weston, N. J., Thelwell, R. C., Bond, S., & Hutchings, N. V. (2009). Stress and coping in single-handed round-the-world ocean sailing. *Journal of Applied Sport Psychology*, *21*, 460- 474. doi:10.1080/10413200903232607

Wilson, M. R., Wood, G., & Vine, S. J. (2009). Anxiety, attentional control, and performance

impairment in penalty kicks. *Journal of Sport & Exercise Psychology, 31*, 761–775.

Wood, A. G., Barker, J. B., Turner, M., & Sheffield, D. (2018). Examining the effects of rational emotive behavior therapy (REBT) on performance outcomes in Elite Paralympic Athletes. *Scandinavian Journal of Medicine & Science in Sports, 28*, (1), 329-339. doi: 10.1111/sms.12926

Wood, A. G., Barker, J. B., & Turner, M. J. (2017a). Developing performance using rational emotive behavior therapy (REBT): a case study with an elite archer. *The Sport Psychologist*, *31*, 78-87.

Wood, G., Jordet, G., & Wilson, M. R. (2015). On winning the "lottery": psychological preparation for football penalty shoot-outs. *Journal of Sports Sciences*, *33*, 1758-1765.

Wood, J. V., Perunovic, W. Q., & Lee, J. W. (2009). Positive self-statements: Power for some, peril for others. *Psychological Science*, *20*, 860–866.

Wood, A. G., Turner, M. J., Barker, J. B., & Higgins, S. J. (2017b). Investigating the effects of irrational and rational self-statements on motor-skill and hazard-perception performance. *Sport, Exercise, and Performance Psychology, 6*, 384-400. doi: 10.1037/spy0000095

Zinsser, N., Bunker, L.K, & Williams, J.M. Cognitive techniques for improving performance and building confidence. In J.M. Williams (Ed.), *Applied Sport Psychology: Personal growth to peak performance* (5th Ed.). McGraw-Hill College, 2006.

Figure 1.

Rational and irrational self-talk.

Rational self-talk	Rational beliefs type	Irrational self-talk	Irrational beliefs type
I want to sink this but that doesn't mean I must	Preference	I want to sink this putt and therefore I must'	Demandingness
If I don't succeed in this task, it will be bad but not awful	Anti-awfulizing	If I don't succeed in this task it would be awful	Awfulizing
If I don't succeed in this task, I will not like it, but I will be able to stand it	Low frustration tolerance	I would not be able to stand failing in this task	High frustration tolerance
If I fail to sink this putt then I will have failed, but that would not make me a failure	Self-acceptance	If I miss this putt, it would make me a failure	Depreciation

Highlights

- Rational self-talk led to more accurate golf putting than irrational self-talk
- Rational self-talk was perceived as more facilitative than irrational self-talk
- Rational self-talk was perceived as more useful than irrational self-talk
- Improvements from baseline emerged for both rational and irrational self-talk

[i] Baseline golf putting scores, N = 2; rational self-talk golf putting scores, N = 1; irrational self-talk golf putting scores, N = 3; time 2 golf putting scores, N = 2; time 3 golf putting scores, N = 2.