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.

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Turner, M. J*., Carrington, S., & Miller, A.

Centre for Sport, Health and Exercise Research, Staffordshire University

*corresponding author: B180, Brindley Building, Leek Road, Staffordshire University, Stoke on Trent, ST4 2DF, 01782294295, m.turner@staffs.ac.uk

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Abstract

It is not fully understood to what extent cognitive mediators are involved in the transaction between contextual factors and athlete mental health. Rational emotive behaviour therapy (REBT) holds that primary irrational beliefs lead to psychological distress through secondary irrational beliefs. Therefore this study examined the mediational effects of primary and secondary irrational beliefs on psychological distress across three sport participation groups; non-sport participants, recreational sport participants, and elite athletes. This study also examined the differences in irrational beliefs and psychological distress between individual and team sport participants, between females and males, and across the three sport participation groups. Data revealed that secondary irrational beliefs mediated the relationships between primary irrational beliefs and psychological distress. Between-groups analyses revealed that elite athletes demonstrated smallest depreciation irrational beliefs, and elite female athletes reported greater depression symptoms than elite male athletes. The implications of the findings for research and applied work are discussed.

Keywords: mental health; well-being; appraisal; anxiety, anger

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.

The mental health and psychological well-being of athletes has been brought into focus recently, both in the media and in research. A recent *Frontiers in Psychology* special issue (MacIntyre, Van Raalte, Brewer, Jones, O'Shea, & McCarthy, 2016) brought the current understanding of athlete mental health to the fore. Also, Olympic swimmer Michael Jamieson has spoken openly about his experiences of depression that contributed to his retirement, stating that he was being "far too analytical of my performances, expecting far too much of myself on a day-to-day basis in training" ("Michael Jamieson: Depression Goes Unrecognized in Elite Sport," 2017). Some authors (Hughes & Leavey, 2012) posit that athletes are at greater risk of mental illness due to the contextual demands of sport such as the requirement for high effort, great investment of time, and high exertion of energy, leading to loss of autonomy and disempowerment, which are symptomatic of burnout that is strongly correlate with affective disorders such as depression (Creswell & Eklund, 2007).

Recently researchers have suggested that athletes may be vulnerable to depressive symptoms (dysphoria), due to the stressful nature of being an athlete (Frank, Nixdorf, & Beckmann, 2015). Indeed, past research has indicated that contextual factors can increase the risk of depression, such as injuries, overtraining, excessive stress, competitive failure, and aging (e.g., Nixdorf, Frank, & Beckmann, 2016; Reardon & Factor, 2010), tournament frequency, important tournaments, and chronic stress (Nixdorf, Frank, & Beckmann, 2015). In addition, researchers have found that athletes competing in individual sports, compared to team sports, report higher symptoms of depression (Nixdorf et al., 2016) and that female athletes report greater prevalence of depressive symptoms than male athletes (Schaal et al., 2011; Storch, Storch, Killiany, & Roberti, 2005; Wolanin, Hong, Marks, Panchoo, & Gross,

2016). Further, those engaged in sport report lower levels of depressive symptoms than those not engaged in sport (Armstrong & Oomen-Early, 2007; Uglesic et al., 2014). Therefore, demographic factors appear to be important in the study of athlete mental health.

However, when viewed through a cognitive-behavioural lens, it is not yet fully understood whether and to what extent cognitive mediators are involved in the transaction between contextual factors and athlete mental health. Given the importance of mental health in athletes, and the recent call to action within the sport psychology domain (MacIntyre et al., 2016), the present study seeks to advance the knowledge base concerning the antecedents of psychological distress in athletes. Psychological distress is negatively related to mental health (Payton, 2009) and has been defined as a state of emotional suffering characterized by symptoms of depression and anxiety (Mirowsky & Ross, 2002). In the current study separate markers of anxiety, depression, and anger, are used indicate psychological distress.

One cognitive-behavioural approach that is receiving growing attention in sport and exercise literature (see Turner, 2016 for a review) is rational emotive behaviour therapy (REBT; Ellis, 1957). REBT was the first cognitive-behavioural theory (CBT) and posits that it is not events that directly cause psychological distress; rather it is one's beliefs about the events that lead to emotional and behavioral reactivity. REBT is distinguished from other CBT approaches by placing irrational and rational beliefs at its core. In REBT rational beliefs (flexible, non-extreme, and logical) lead to psychological health, whereas irrational beliefs (rigid, extreme, and illogical) lead to psychological distress. There are four types of rational and irrational beliefs. Rational beliefs comprise a primary rational belief (preferences) and three secondary beliefs (anti-awfulizing, high frustration tolerance; HFT, and self/other acceptance). Irrational beliefs comprise a primary irrational belief (demandingness; PIB) and three secondary beliefs (awfulizing; AWF, low frustration tolerance; LFT, and self/other depreciation; DEP).

Research investigating REBT within sport has focused on the application of REBT with a range of athletes, using group and one-to-one intervention methods (e.g., Cunningham & Turner, 2016; Deen, Turner, & Wong, 2017; Turner & Barker, 2013; Turner, Slater, & Barker, 2015; Wood, Barker, & Turner, 2016). Results from the extant literature support the application of REBT with athletes to reduce irrational beliefs and anxiety, and increase rational beliefs, resilient qualities, and performance. However, research is yet to examine the prevalence of irrational beliefs in athletes compared to non-athletes and to fully explore the relationships between irrational beliefs and psychological distress. In fact, just one study has examined the relationships between irrational beliefs and athlete psychological well-being, finding that irrational beliefs were positively related to increased physical and emotional exhaustion of Gaelic Football athletes over an in-season eight-week period (Turner & Moore, 2016). In contrast, the relationship between irrational beliefs and psychological distress (and mental illness) is much explored outside of sport (see Turner, 2016, for a review). In one study (Macavei, 2005), a comparison between non-depressed, dysphoric, and clinically depressed participants revealed that irrational beliefs (AWF, LFT, and DEP) were highest in clinically depressed participants, followed by dysphoric participants, and then non-depressed participants. Interestingly, PIB did not differ between non-depressed, dysphoric, and clinically depressed participants. A recent meta-analysis investigating the relationships between irrational beliefs and negative affect (Visla, Fluckiger, Holtforth, & David, 2016) revealed significant small to moderate effect sizes for general distress (r = .36), depression (r = .33), anxiety (r = .41), anger (r = .25), and guilt (r = .29). In general, there is a moderate but robust relationship between irrational beliefs and psychological distress (MacInnes, 2004). At present, it is not known whether the relationships between irrational beliefs and psychological distress hold true in athletic samples.

The relationships between irrational beliefs and psychological distress may be driven by particular core irrational beliefs (Visla et al., 2016). Indeed, the study by Macavei (2005) found that PIB did not distinguish between non-depressed, dysphoric, and clinically depressed participants, and past research suggests that particular *secondary* irrational beliefs (AWF, LFT, and DEP) might offer more proximal causes for specific emotions. In one study (David, Schnur, & Belloiu, 2002), it was found that AWF helped to explain the most variance in anxiety (alongside high motivational relevance, low motivational congruence, and low emotion-focused coping), LFT helped to explain the most variance in anger (alongside high motivational relevance, low motivational congruence, and high other-accountability), and DEP helped to explain the most variance in depression (alongside high motivational relevance, low motivational congruence, low problem focused coping, and low future expectations). With these findings replicated (David, David, Ghinea, Macavei, & Kallay, 2005), it seems that PIB relate to anxiety, anger, and depression, most strongly via AWF, LFT and DEP, respectively. The notion that secondary irrational beliefs are more proximal to psychological distress has been subjected to mediation analyses. In one study of varsity students (DiLorenzo, David, & Montgomery, 2007), secondary irrational beliefs (AWF, LFT, and DEP) were found to fully mediate the relationship between PIB and psychological distress. DiLorenzo et al. advocate the examination of specific emotions as opposed to a single indicator of psychological distress, and call for the use of a more diverse sample.

The mediational effects of irrational primary and secondary beliefs on psychological distress have been conceptualized in REBT theory (Ellis & Dryden, 1997) and past research (e.g., DiLorenzo et al., 2007) as the “REBT-I Model” (p. 767). In the REBT-I Model, secondary irrational beliefs mediate the relationship between PIB and psychological distress. The present study tests the REBT-I Model (Figure 1) in a non-sporting and sporting sample (recreational and elite), and makes specific hypotheses in relation to the REBT-I Model with

regards to predicting symptoms of anxiety, anger, and depression (psychological distress). This is the first study to examine the core primary and secondary irrational beliefs in varying levels of sport participation and the first to test the REBT-I Model in a sporting sample. Indeed, the present study serves as both a replication of DiLorenzo et al.'s mediational study and an extension to the literature by examining specific emotions that indicate psychological distress and irrational performance beliefs (rather than general irrational beliefs), in a sporting sample. The present study also adds to the extant literature concerning the mental health of sport participants by seeking to understand the potential role of irrational beliefs in symptoms of anxiety, anger, and depression. Following DiLorenzo et al.'s recommendations, the present study investigates the mediational effects of secondary irrational beliefs on the relationship between PIB and psychological distress (anxiety, anger, and depression).

The present study chiefly aims to test the REBT-I Model across non-sport participants, recreational sport participants, and elite athletes. First, in line with REBT theory (REBT-I Model) and past research, and following mediation guidelines (e.g., Hayes, 2009), it is hypothesized that secondary irrational beliefs will mediate the relationships between PIB and forms of psychological distress. Specifically, it is hypothesized that LFT, AWF, and DEP will mediate the effects of PIB on anxiety, anger, and depression.

A secondary aim of the present study is to examine the differences in irrational beliefs and psychological distress between individual and team sport participants, between females and males, and across non-sport participants, recreational sport participants, and elite athletes. The investigation of between-groups differences in irrational beliefs and psychological distress adds to past research that reports differences between individual and team sport athletes (Nixdorf et al., 2016), females and males (e.g., Wolanin et al., 2016), and between non-athletes and athletes (e.g., Ugle et al., 2014).

It is hypothesized that, based on recent research indicating differences between sport type in depression (Nixdorf et al., 2016), team sport athletes would report greater psychological distress compared to individual sport athletes. In addition, past research indicates that females may be more prone to irrational beliefs (Walen & Greiger, 1988) and mental ill-health (e.g., Wolanin et al., 2016), therefore in the present study it is hypothesized that females would report greater irrational beliefs and greater psychological distress than males. Finally, in line with the extant literature (e.g., Ugle et al., 2014), it is hypothesized that non-sport participants would report the greatest irrational beliefs and psychological distress, followed by recreational sport participants, and then elite athletes.

Method

Participants

Participants (*N* = 423, female = 223, *M*age = 27.16; *SD*age = 10.50; age range = 14-70) were British elite athletes (*n* = 127, female = 50), recreational sports participants (*n* = 174, female = 83), and non-sport participants (*n* = 122, female = 51). Elite athletes were involved in team (*n* = 82) and individual (*n* = 45) sports, and included athletes participating in futsal (*n* = 21), football (*n* = 29), swimming (*n* = 3), running (*n* = 2), figure skating (*n* = 4), cricket (*n* = 1), tennis (*n* = 2), badminton (*n* = 2), gymnastics (*n* = 10), athletics (*n* = 2), squash (*n* = 2), basketball (*n* = 1), golf (*n* = 1), show jumping (*n* = 1), hockey (*n* = 7), mixed martial arts (*n* = 1), paddle boarding (*n* = 1), karate (*n* = 1), rackets (*n* = 1), rugby (*n* = 13), skeleton (*n* = 1), table tennis (*n* = 1), judo (*n* = 14), trampolining (*n* = 1), archery (*n* = 1), and triathlon (*n* = 4). Recreational sport participants were involved in team (*n* = 63) and individual (*n* = 66) sports (*n* = 45 unreported), and included individuals participating in football (*n* = 36), swimming (*n* = 9), running (*n* = 7), cheerleading (*n* = 1), figure skating (*n* = 2), cricket (*n* = 4), tennis (*n* = 14), badminton (*n* = 7), netball (*n* = 3), gymnastics (*n* = 1), korfball (*n* = 2), athletics (*n* = 2), squash (*n* = 2), basketball (*n* = 3), bowls (*n* = 1),

bodybuilding (*n* = 1), golf (*n* = 1), show jumping (*n* = 4), hockey (*n* = 5), mixed martial arts (*n* = 1), karate (*n* = 1), rugby (*n* = 7), shooting (*n* = 1), volleyball (*n* = 1), dance (*n* = 1), pool (*n* = 1), mountaineering (*n* = 1), karting (*n* = 1), and triathlon (*n* = 9). Participants were recruited using convenience, snowball, and random sampling via social media. A university ethics panel granted ethical approval, and all participants completed informed and/or minor assent prior to any data collection. All data were collected using an online questionnaire (Qualtrics), which took approximately 5 minutes to complete.

Measures

Irrational performance beliefs. To assess the presence of irrational beliefs, participants completed the irrational performance beliefs inventory (iPBI; Turner et al., 2016). The questionnaire is designed for usage in performance settings (such as sport) and consists of 28-items, seven-items for each of its four subscales (PIB, LFT, AWF, and DEP). Responses are made on a 5-point Likert-scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The iPBI has been shown to have good criterion, construct, and concurrent reliability (Turner et al., 2016). For the current sample, Cronbach's α were PIB = .68, LFT = .74, AWF = .70, DEP = .87. Therefore, subscales demonstrated acceptable to good internal consistency (Loewenthal, 2004).

Psychological distress. The State Trait Personality Inventory (STPI; Spielberger, 1979) was used in order to assess participants' symptoms of anxiety, anger, and depression. Anxiety, anger, and depression are considered major indicators of psychological distress, and have been referred to as "critical psychological vital signs that are strongly related to an individual's well-being" (Speilberger & Reheiser, 2009, p. 272). The STPI comprises 80 items assessed on a Likert scale (1 = *almost never*; 4 = *almost always*), 40 assessing state and 40 assessing trait emotional tendencies including anxiety, anger, depression, and curiosity, distributed in 10-items per emotion. Only trait anxiety, anger, depression items were used in

the current study, demonstrating internal consistency, with Cronbach's α coefficients of .82 for anxiety, .86 for anger, and .84 for depression.

Procedures

Participants were recruited using convenience, snowball, and random sampling via social media. Convenience sampling was achieved by liaising with U.K. sport and exercise psychologists and researchers to gain access to athlete groups with whom they worked. Snowball sampling was achieved by encouraging participants, on completion of the survey, to send the details of the study to other potential participants that may or may not take part in sport. Random sampling was achieved via a social media campaign targeting sporting organizations to engage their athletes in the project, and targeting the general public for the recreational and non-sport samples. The authors adopted multiple sample recruitment devices to limit self-selection and sampling biases associated with a single approach to sample recruitment. Potential participants were asked to email the authors to take part in the study and were then sent the online questionnaire (iPBI and STPI) to complete via a hyperlink sent to them via email. In addition to irrational beliefs and emotions data, participants were also asked to report their age, sex, the sport they compete within and the competitive level of their sport. Participants were then fully debriefed as to the purpose of the study.

Analytic Strategy

Prior to main data analyses, data underwent missing values analyses and were screened for outliers. Missing data analyses showed that data were not missing completely at random (MCAR) for any variable, and thus missing data were not imputed. To identify outliers, Shapiro Wilks tests were performed, and *z* scores inspected. Significant outliers with a *z* score of 2SDs were windzorized (Smith, 2011).

In line with recent studies (DiLorenzo et al., 2007; Felton & Jowett, 2013) adopting the same study design, descriptive statistics including means (*M*s), standard deviations (*SD*s),

and intercorrelations (*r*s) were calculated for the main study variables including PIB, LFT, AWF, DEP, anxiety, anger, depression, and age as a prerequisite for mediational analyses (Table 1). Because the participant sample included three distinct participation groups (elite athletes, recreational sport participants, and non-sport participants), it was also important to examine the differences in irrational beliefs and psychological distress between these groups. Indeed, past research has not investigated the differences in irrational beliefs between elite athletes and sub-elite or non-athletes. In addition, due to past research indicating sex differences in irrational beliefs and psychological distress, the differences between females and males were also assessed. Finally, as past research has indicated differences in depression between team and individual athletes, the differences between team and individual sport participants in irrational beliefs and psychological distress were also examined. Therefore, two 3-way MANCOVAs were conducted, one for the four core irrational beliefs, and one for the three emotions that indicate psychological distress.

Mediation with bootstrapping analyses were conducted using Model 4 of the Process macro (Haynes, 2012) in SPSS, to replicate the REBT-I model defined by DiLorenzo et al. (2007), but with the three distinct emotions anxiety, anger, and depression. A total of nine meditation analyses were conducted to examine the mediational effects of LFT, AWF, and DEP, on the relationship between PIB and each of the three emotions (anxiety, anger, depression). To assess indirect effects in the mediation analyses, 95% bias corrected bootstrap confidence intervals (based on 5,000 bootstrap samples) were used.

Results

Descriptive statistics

Descriptive statistics can be seen in Table 1, including mean (± SD) scores for irrational performance beliefs, anxiety, anger, and depression, across sport participation group, sex, and sport-type, and norm levels for each variable. Data showed that participants

in the current sample scored higher than norms on all variables, accept for symptoms of depression, where present data was equal to norm data. Correlation coefficients (Table 2) revealed that all irrational beliefs were positively and significantly related to all psychological distress variables, and with each other. These inferential statistics, alongside past research (DiLorenzo et al., 2007; Turner et al., 2016), indicate that irrational beliefs are positively associated with psychological distress, thus warranting the inclusion of all irrational beliefs and psychological distress variables in the mediation analyses. Because age was weakly but significantly related to LFT, DEP, and anxiety, and has been shown to be related to irrational beliefs in the past (e.g., Turner et al., 2016), age was included as a covariate in all further analyses.

Group differences

Irrational beliefs. The three-way MANCOVA indicated a significant main effect for sport participation group, $\Lambda = .89$, $F\ (4,588) = 4.33$, $p < .001$, $\eta^2 = .06$. A significant between-subjects effect was revealed for DEP, $F\ (2,297) = 8.46$, $p < .001$, $\eta^2 = .05$, with pairwise comparisons of means indicating that elite athletes ($M = 16.14$; $SD = 5.40$) reported significantly smaller ($p < .001$) DEP than non-sporting ($M = 19.82$; $SD = 4.23$) participants, and that recreational athletes ($M = 17.68$; $SD = 5.98$) reported significantly smaller ($p < .03$) DEP than non-sporting participants. There were no significant between-subjects effects for PIB, $F\ (2,297) = 1.86$, $p > .05$, $\eta^2 = .01$, LFT, $F\ (2,297) = 1.62$, $p > .05$, $\eta^2 = .01$, and AWF, $F\ (2,297) = .42$, $p > .05$, $\eta^2 < .01$. See Table 1 for mean irrational beliefs across sport participation groups.

There was a significant main effect for sex, $\Lambda = .96$, $F\ (4,294) = 3.26$, $p < .02$, $\eta^2 = .04$. A significant between-subjects effect was revealed for PIB, $F\ (1,297) = 8.46$, $p < .01$, $\eta^2 = .03$, with pairwise comparisons of Means indicating that females ($M = 25.97$; $SD = 3.64$) reported significantly greater PIB than males ($M = 24.26$; $SD = 3.39$). A significant between-

subjects effect was revealed for LFT, F (1,297) = 10.50, $p < .01$, $\eta^2 = .34$, with pairwise comparisons of means indicating that females (M = 26.99; SD = 3.33) reported significantly greater LFT than males (M = 25.17; SD = 3.58). A significant between-subjects effect was revealed for AWF, F (1,297) = 6,76, $p = .01$, $\eta^2 = .02$, with pairwise comparisons of means indicating that females (M = 24.28; SD = 3.89) reported significantly greater AWF than males (M = 22.68; SD = 4.03). No significant between-subjects effect was revealed for DEP, F (1,297) = 2.30, $p > .05$, $\eta^2 = .01$.

There was no significant main effect for sport-type, $\Lambda = .99$, F (4,294) = .65, $p > .05$, $\eta 2 = .01$, indicating no differences in irrational beliefs between team and individual sports participants.

Psychological distress. The three-way MANCOVA indicated no significant main effect for participation group, $\Lambda = .96$, F (6,590) = 1.84, $p > .05$, $\eta^2 = .02$. There was a significant main effect for sex, $\Lambda = .91$, F (3,295) = 9.78, $p < .01$, $\eta^2 = .09$. A significant between-subjects effect was revealed for anxiety, F (1,310) = 13.924, $p < .001$, $\eta^2 = .05$, with pairwise comparisons of means indicating that females (M = 21.39; SD = 5.29) reported significantly greater ($p < .001$) anxiety than males (M = 18.76; SD = 4.51). There was no significant main effect for sport-type, $\Lambda = .99$, F (3,295) = .11, $p > .05$, $\eta^2 = .001$, indicating no differences in psychological distress between team and individual sports participants.

There was a significant interaction effect for group and sex in depression symptoms scores, F (2,297) = 3.80, $p < .03$, with follow-up univariate (ANCOVA) tests indicating that elite females athletes reported significantly ($p < .04$, $\eta^2 = .03$) greater depression symptoms (M = 17.44; SD = 5.86) than elite male athletes (M = 15.30; SD = 4.92; Table 3).

In sum, elite athletes demonstrated smaller DEP than recreational sport participants, and recreational sport participants reported smaller DEP than non-sport participants. However, there were no differences in PIB, LFT, or AWF between sport participation groups.

Females reported greater PIB, LFT, and AWF, and anxiety, than males. Also, elite female athletes reported greater symptoms of depression than elite male athletes. There were no differences in irrational beliefs and psychological distress between sport-types (team vs. individual).

Mediation analyses

Due to significant MANCOVAs, all mediation analyses included participation group and age as covariates, allowing participation group and age to be accounted for. In line with past research (DiLorenzo et al., 2007), a graphical representation of each mediation analysis is shown in Figure 2 (anxiety), Figure 3 (anger), and Figure 4 (depression), and in addition, related regression effects (R^2Change), *F* values, bootstrapped standardized confidence intervals (CIs), and Sobel tests, can be seen in Table 4.

Anxiety. For LFT there was no difference between direct and indirect mediated effects of PIB and anxiety. For AWF and DEP, the mediational hypothesis was supported with AWF (*c* path β = .48, $p < .001$ to *c'* path β = .20, $p < .01$) and DEP (*c* path β = .48, $p < .001$ to *c'* path β = .30, $p < .01$), both fully mediating the relationship between PIB and anxiety.

Anger. For LFT, AWF, and DEP, the mediational hypothesis was supported with LFT (*c* path β = .39, $p < .001$ to *c'* path β = .19, $p > .05$), AWF (*c* path β = .39, $p < .001$ to *c'* path β = .04, $p > .05$) and DEP (*c* path β = .39, $p < .001$ to *c'* path β = .17, $p < .05$), both fully mediating the relationship between PIB and anxiety.

Depression. For LFT there was no difference between direct and indirect mediated effects of PIB and depression. For AWF and DEP, the mediational hypothesis was supported with AWF (*c* path β = .16, $p < .05$ to *c'* path β = -.14, $p > .05$) and DEP (*c* path β = .16, $p < .05$ to *c'* path β = -.04, $p > .05$) both fully mediating the relationship between PIB and depression.

In sum of mediation analyses, AWF and DEP mediated the relationships between PIB and all three emotions, but LFT only mediated the relationship between PIB and anger.

Discussion

This study chiefly aimed to test the REBT-I Model (Figure 1) across non-sport participants, recreational sport participants, and elite athletes, in the prediction of psychological distress. The present study is the first published study to investigate the role of irrational beliefs in the psychological distress (indicated by symptoms of anxiety, anger, and depression) of athletes. In line with the REBT-I Model (DiLorenzo et al., 2007), results revealed that AWF and DEP mediated the relationships between PIB and symptoms of anxiety, anger, and depression (psychological distress). However, LFT mediated the relationship between PIB and anger only. These findings support extant research that suggests secondary irrational beliefs are more proximal to psychological distress (e.g., David et al., 2002), and adds to the growing evidence purporting that irrational beliefs are deleterious for mental health (e.g., Visla et al., 2016). The findings of the current study also extend the literature regarding athlete mental health (e.g., Nixdorf et al., 2016), by offering potential cognitive-behavioural associates (irrational beliefs) of psychological distress. This study lends additional support to the use of the iPBI for use in performance settings to measure irrational beliefs, adding to the iPBI's predictive validity by revealing positive relationships between iPBI subscales and psychological distress in sport participants, extending similar findings revealed in an occupational setting (Turner et al., 2016).

A secondary aim of the present study was to examine the differences in irrational beliefs and psychological distress between individual and team sport participants, between females and males, and across non-sport participants, recreational sport participants and elite athletes. Results revealed that elite athletes reported less DEP than recreational sport participants, and that recreational sport participants reported less DEP than non-sport

participants, but in contrast to past research (e.g., Ugle et al., 2014), there were no differences in psychological distress across the groups. This is the first published study to reveal differences in irrational beliefs across sport participation groups. Data analysis also showed that female participants reported greater PIB, LFT, AWF and anxiety than males, and elite female athletes reported greater symptoms of depression than elite male athletes. The finding that females reported greater irrational beliefs than males supports past REBT literature (e.g., Walen & Greiger, 1988), and females reporting greater symptoms of anxiety supports past research that indicates that female sport participants may be more prone to mental ill-health (e.g., Wolanin et al., 2016). This is also consistent with data from the general population. Finally, contradicting past research (Nixdorf et al., 2016), and against a study hypothesis, there were no differences in irrational beliefs or psychological distress between individual and team sport participants.

The present study supports contemporary theory and research (e.g., DiLorenzo et al., 2007) regarding the relationships between the four core irrational beliefs and psychological distress. Specifically, the REBT-Model I was broadly supported, with the relationships between PIB and anxiety, anger, and depression mediated by secondary irrational beliefs (AWF, LFT, and DEP). However, LFT only mediated the relationship between PIB and anger. These findings suggest that, as found in previous literature (David et al., 2002; David et al., 2005; DiLorenzo et al., 2007), PIBs are primary appraisal components, while AWF, DEP, and to some extent LFT, are secondary appraisal mechanisms. Past research has also found that the relationships between PIB, LFT, and psychological distress are less consistent (e.g., DiLorenzo et al., 2007), which might suggest that PIB and LFT might contribute to anxiety and depression separately, rather than interactively. The seemingly specific relationship between LFT and anger supports past research demonstrating the association between LFT and aggressive expression of anger (Martin & Dahlen, 2004), and reduced

anger control (Moller & Van der Merwe, 1997). The present study not only supports previous research, it also extends the literature by demonstrating validity for the REBT-Model I in specific emotional indicators of psychological distress, as called for by researchers (DiLorenzo et al., 2007). The present study also extends past research by recruiting a sport participation sample, including both recreational and elite athletes. Importantly, the findings yield a similar pattern of results as previous work in varsity samples (e.g., DiLoreonzo et al., 2007), thus aiding the generalizability of REBT-Model I across different populations.

The implications of the mediation results in the present study are threefold. First, the data provides an insight into potentially important associates, namely the four core irrational beliefs, of psychological distress across a spectrum of sport participants. Importantly, the current study data indicates that the mediational relationships present within general and clinical populations (e.g., David et al., 2005) are also present within a sport participation sample. While past research has elucidated important situational factors that increase mental health risk (e.g., injuries, competitive failure, ageing; Nixdorf et al., 2016; Reardon & Factor, 2010), the present study offers cognitive factors that are ultimately more controllable for athletes, although it should be noted that irrational beliefs can be difficult to change (Ellis & Dryden, 1997) due to being deeply ingrained (Macavei & McMahon, 2010). That is, it is not always possible for an athlete to avoid injury or competitive failure, and of course nobody can escape aging, but through REBT it is possible to reduce irrational beliefs at a general (e.g., Turner & Barker, 2013) and specific (Cunningham & Turner, 2016) level. Although the current study offers no direct evidence that irrational beliefs can be controlled, the efficacy of REBT in reducing emotional disturbance has been supported in hundreds of research articles (David, Mongomery, Macavei, & Bovbjerg, 2005) in both clinical and nonclinical populations, youths and adults (David & Avellino, 2002), and by three meta-analyses (Engles, Garnefski, & Diekstra, 1993; Gonzalez, Nelson, Gutkin, Saunders, Galloway, &

Shwery, 2004; Lyons & Woods, 1991). In particular, one meta-analysis offered strong support for REBT (Engles et al., 1993; effect size of 1.62) and concluded that REBT's superiority over placebo treatment conditions was directly related to an increase in rational thinking. Therefore, practitioners can help athletes to control their irrational beliefs (i.e., reduce irrational beliefs in favor of rational beliefs) in order to reduce the risk of experiencing psychological distress.

Second, in the case of anger symptoms, the mediation analyses indicate that LFT is more proximal than the other core irrational beliefs. Therefore, interventions designed to help individuals reduce their anger should focus on revealing potential LFT beliefs, and then in line with REBT, disputing LFT and endorsing HFT. Finally, mediation analyses revealed that both AWF and DEP are more proximal to all three emotions, and therefore a full assessment of irrational beliefs should be completed with clients who present with anxiety, anger, or depression symptoms. This is important because REBT practitioners strive towards uncovering a client's full irrational beliefs where secondary irrational beliefs (LFT, AWF, and or DEP) are derived from primary irrational beliefs (Dryden, 2009). So when working with an individual, irrational beliefs are more accurately revealed as couplets such as "I must be accepted by people (PIB) and it means I am worthless if I am not (DEP)," for example. The results of the present study reinforce the importance of helping clients to explore both primary and secondary beliefs as potential associates of psychological distress.

The results of the mediation and correlational analyses report in the present paper should not be taken to mean that irrational beliefs cause psychological distress. Whilst theory and research attest to the directional relationship between irrational beliefs and psychological distress, the cross-sectional data reported in this study were collected at a single time point, thus it is not possible to detect causation. Only one study involving athletes has demonstrated that irrational beliefs predict increases in psychological ill-being (burnout; Turner & Moore,

2016). Also, and importantly, the idea that irrational beliefs can be controlled, and that cognitions can be and should be challenged using logico-empirical disputation in CBTs, has been subject to debate (Longmore & Worrell, 2007). Amidst a lack of empirical support for some of the fundamental tenets of CBT, and a paucity in evidence demonstrating that CBT's effectiveness in reducing psychological distress is mediated cognitively, it may be that cognitive interventions such as those posited within REBT are not a necessary component of therapy (Hayes, Follette, & Linehan, 2004). Despite the evidence that CBTs such as REBT are effective treatments, the notion of cognitive mediation is in a state of academic and therapeutic limbo. Readers should be mindful of this debate when interpreting the therapeutic implications of the current study.

The between-groups analyses in the current study for irrational beliefs revealed that elite athletes reported the lowest DEP, followed by recreational sport participants, and then non-sport participants. These results suggest two potential occurrences in this sample. First, those with low DEP are more likely to pursue, and progress in, a career in elite sport. It may be that holding low DEP beliefs, where failures and set-backs are not generalized to the self, allow for more functional responses to adversity (e.g., Turner, 2016), which may facilitate an athletes' progression and ascension to elite standing. However, although consistent with REBT theory, this conjecture goes beyond the data and scope of the current study. Second, it may be that repeated exposure to adversity, such as for example, failure (or potential failure) may help to reduce irrational beliefs such as DEP. To explain, since DEP reflects the global-rating of oneself on the basis of one event, such that failing "makes me a failure", repeated exposure to failure may serve to discredit this belief, because despite failing the athlete is still able to progress in their careers. In REBT, with athletes who present with DEP failure beliefs, the course of action is often to set behavioural assignments between-sessions, where the athlete is prompted to face potential failure to show that even if they fail they are still able to

accept themselves. Therefore, the finding that elite athletes have the lowest DEP scores could be a function of the adverse environment (e.g., Nixdorf et al., 2015) in which athletes toil. This is important because past research indicates that athletes may be more susceptible to depression when faced with failure (Hammond, Gialloreto, Kubas, & Davis, 2013). So having low DEP beliefs may be important for helping athletes maintain psychological well-being particularly in times of failure, where athletes are more susceptible to depression.

In addition, it is also possible that elite athletes who experience professional success and financial wellbeing may be less likely than recreational sport participants and non-sport participants to hold DEP beliefs. To explain, one of the reasons that DEP is associated with psychological distress is because the belief "I failed so I am therefore I failure" expresses contingent self-worth. It stands to reason that athletes who have contingent self-worth, who also experience high perceived success, may consider themselves to be "a success", which could be reflected in low DEP beliefs. However, the current study does not measure contingent self-worth, and therefore any reasoning used to explain the low DEP beliefs in the elite athlete sample in the current study is conjectural. Future research should investigate contingent self-worth more fully, because low DEP beliefs do not necessarily reflect high unconditional self-acceptance (USA) beliefs (which are rational beliefs). Just because elite athletes express low DEP, does not mean that they hold unconditional perceptions of their self-worth (Cunningham & Turner, 2016). Indeed, irrational and rational beliefs are relatively orthogonal (Ellis, David, & Lynn, 2010).

The between-groups analyses also revealed that female participants reported greater PIB, LFT, and AWF than males, which is in line with past research concerning sex differences in irrational beliefs (e.g., Walen & Greiger, 1988). Also, the data showed that across the groups, female participants reported greater symptoms of anxiety than males, and that specifically within the elite athlete group, female athletes reported greater symptoms of

depression than male athletes. Some research suggests that in the general population, females are diagnosed with depression and anxiety disorders almost twice as often as males (e.g., Schaal et al., 2011), and in research concerning athletes, the finding that females report greater symptoms of depression than males is a consistent discovery (e.g., Hammond et al., 2013; Junge & Feddermann-Demont, 2015; Storch et al., 2005; Wolanin et al., 2016). Schaal et al. (2011) sampled a large (>2,000) population of athletes and found that females were 56% more likely to have suffered from an anxiety disorder than males, and that nearly twice as many females than males reported experiencing depression, over their lifetime. Schaal et al. (2011) concluded that female athletes appear to be more susceptible to difficulties encountered in their environment than males. There are many potential genetic, physiological, and socio-environmental explanations for the sex differences in mental health (McLean & Anderson, 2009), which are beyond the scope of the present study. But the concomitant sex differences in irrational beliefs found in the current study surely add to the previously observed psychosocial differences between females and males (e.g., worry reinforced by gender-norms; Bangasser et al., 2010), which may help explain sex differences in anxiety and depression symptomatology. That is, irrational beliefs should be further explored as a potential mechanism for sex differences in psychological distress, alongside the complex constellation of additional antecedents.

Data from the current study also revealed no differences across sport participation groups in psychological distress. This finding supports some previous literature showing that athletes experience depression at approximately the same rate as non-athletes (Yang et al., 2007), but is also in contrast to several other researchers' findings (e.g., Ugle et al., 2014). Similar to the current paper, Ugle et al. used three sport participation groups, but found that there were less depressive symptoms in athletes compared to recreation and non-sport participants. However, Ugle et al.'s study was conducted with Croatian participants and they

had circa 600 participants compared to the 423 U.K. participants in the current study, so the two studies are not necessarily directly comparable. Other research in collegiate athletes and non-athletes has also found that athletes report lower depression symptoms than non-athletes (Armstrong & Oomen-Early, 2009; Proctor & Boan-Lenzo, 2010). There are some plausible explanations as to why athletes may report less depressive symptoms that non-athletes, such as regular exercise and social support (see Armstrong & Oomen-Early, 2009), but data from the current study showed that sport participation group was not important in the between-groups analyses or the mediational analyses.

Finally, there were no differences in irrational beliefs or psychological distress between individual and team sport participants. This finding is in contrast to past research that has found that athletes engaged in individual sport reported greater symptoms of depression than athletes engaged in team sports (e.g., Nixdorf et al., 2013; 2016; Schaal et al., 2011). However, as well as symptoms of depression, the current study also offers findings for anxiety and anger symptomatology, similarly revealing no differences between individual and team sport participants. It is unclear why the current study did not replicate previous findings. With past studies conducted in France (Schaal et al., 2011) and Germany (Nixdorf et al., 2016), and the current U.K. study, perhaps national and cultural differences should be considered in future research. Also, the number of sports represented in the current study (n = 43) is larger than that of past research, which represents a less homogenous sample in terms of sport type, but gives a broader perspective in sport activity in general, rather than for specific sports. For example, Nixdorf et al. (2016) recruited 199 athletes engaged in eight sports, with the majority competing in soccer (n = 113). Therefore, future research should replicate past research with equitable samples in order to make direct comparisons.

This study has some limitations that if addressed could strengthen the examination of irrational beliefs and psychological distress in athletes. First, the cross-sectional and

correlation nature of the study means that causation between irrational beliefs and psychological distress cannot be implied. Indeed, this is a limitation that pervades much of the irrational beliefs literature (Turner, 2016). Thus, future research could compare the irrational performance beliefs of depression, dysphoric, and control participants, replicating Macavei (2005) to assess the prevalence of irrational beliefs across varying severities of depression. Second, this study examines the role of irrational beliefs in psychological distress, but does not consider rational beliefs. In fact, research has concentrated more on irrational beliefs than rational beliefs, perhaps reflecting a problem-focused, rather than a benefit-focused, bias in the literature concerning REBT (see Turner, 2016 for a review). This is important because rational and irrational beliefs are relatively orthogonal (i.e., they do not correlate highly; see Bernard, 1998), and so low irrational beliefs do not represent high rational beliefs, and vice versa. Researchers might consider developing a rational beliefs measure that contrasts the iPBI, so that rational beliefs can be included when predicting psychological distress in athletes.

Study limitations notwithstanding, the findings of the current study adds to the body of literature concerning potential associates of psychological distress in athletes, by revealing that irrational beliefs are associated with anxiety, anger, and depression. Further, this study finds support for REBT Model-I (DiLorenzo et al., 2007) in the prediction of psychological distress, offering support for the notion that secondary irrational beliefs are more proximal to psychological distress than primary irrational beliefs. Indeed, the mediational findings in the current paper extend the REBT literature by testing the REBT Model-I in a sport participation sample for the first time. The current study also adds to the vibrant conversation happening in the athlete mental health literature at present. Specifically, this is the first published study to show differences in irrational beliefs across sport participation groups, and males and females. Regarding psychological distress, this study has some findings consistent

with past research, and also some findings inconsistent with past research. For example, the finding that across the sample females reported greater anxiety than males, and that elite female athletes reported greater symptoms of depression than elite male athletes, supports past research (e.g., Wolanin et al., 2016). In contrast, the finding that there were no differences in psychological distress between sport participant groups or individual and team sports is contrary to some previous research (e.g., Nixdorf et al., 2016).

If a conservative stance is taken, that athletes are no more likely to experience mental illness than the general public, we can assume that one in four will be affected each year (England Athletics, 2014), with 17.6% of adults (in England) having at least one common mental disorder and a similar proportion having symptoms which do not fulfil full diagnostic criteria (McManus, Meltzer, Brugha, Bebbington, & Jenkins, 2009). If as proposed in this paper, irrational beliefs represent a risk factor for the mental health of athletes, future research should investigate irrational beliefs and the application of REBT with athletes.

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Figure 1. Graphical illustration of the REBT Model-I (DiLorenzo et al., 2007) tested in the current study.

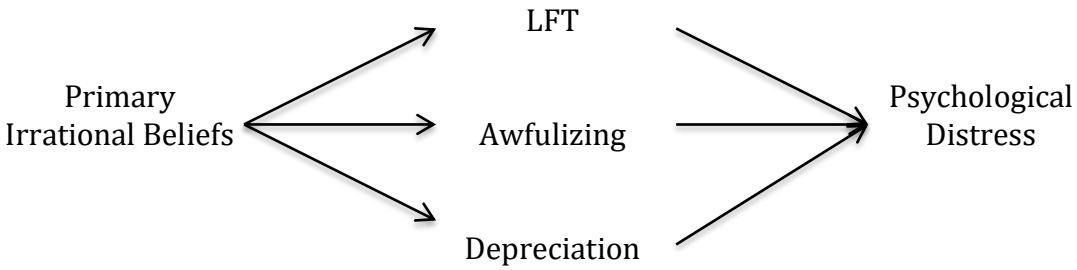

Table 1. Norm levels (iPBI; Turner et al., 2017; STPI; Spielberger, 1995), and M ± SD for all variables across sport participation group, sex, and sport-type.

Variable	Norm levels	Current Sample							
		Overall	Group			Sex		Sport-type	
			Non-sport	Recreational	Elite	Female	Male	Team	Individual
PIB	23.36 ± 5.29	24.91 ± 3.63	23.86 ± 3.37	25.18 ± 3.89	25.18 ± 3.29	25.94 ± 3.65	24.26 ± 3.39	24.83 ± 3.45	25.00 ± 3.75
LFT	23.05 ± 5.54	25.78 ± 3.63	25.04 ± 3.48	25.84 ± 3.55	26.32 ± 3.63	27.00 ± 3.32	25.18 ± 3.58	25.83 ± 3.79	25.89 ± 3.30
AWF	21.28 ± 5.97	23.44 ± 4.05	23.39 ± 3.44	23.58 ± 4.19	22.95 ± 4.22	24.29 ± 3.88	22.68 ± 4.03	23.33 ± 3.92	23.21 ± 4.23
DEP	16.03 ± 7.18	18.05 ± 5.68	19.83 ± 4.24	17.75 ± 5.99	16.14 ± 5.40	18.34 ± 5.86	17.10 ± 5.34	17.60 ± 5.28	17.54 ± 6.00
Anxiety	18.04 ± 4.9	20.14 ± 5.08	18.83 ± 4.83	20.35 ± 4.92	19.74 ± 5.06	21.43 ± 5.29	18.76 ± 4.51	19.58 ± 5.00	20.15 ± 4.99
Anger	18.47 ± 4.75	21.55 ± 6.00	21.60 ± 4.68	21.66 ± 6.29	19.65 ± 6.22	22.07 ± 6.13	20.13 ± 5.82	20.54 ± 6.10	21.25 ± 5.84
Depression	18.05 ± 6.23	18.93 ± 5.01	18.70 ± 3.98	19.34 ± 4.92	18.05 ± 5.02	18.93 ± 5.11	18.51 ± 4.59	18.50 ± 4.82	18.92 ± 4.74
Age	-	27.16 ± 10.49	22.77 ± 6.61	30.84 ± 10.98	26.06 ± 10.60	26.90 ± 10.62	27.17 ± 10.37	22.78 ± 5.68	33.26 ± 12.48

Table 2. Bivariate correlation co-efficients (*r*) for irrational beliefs, emotions, and age.

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. PIB	1	.55**	.63**	.30**	.33**	.22**	.10*	.075
2. LFT	.55**	1	.55**	.32**	.27**	.27**	.10*	-.10*
3. AWF	.63**	.55**	1	.58**	.41**	.35**	.27**	-.04
4. DEP	.30**	.32**	.58**	1	.47**	.46**	.44**	-.114*
5. Anxiety	.33**	.27**	.41**	.47**	1	.51**	.77**	-.096*
6. Anger	.22**	.27**	.35**	.46**	.51**	1	.49**	-.073
7. Depression	.10*	.10*	.27**	.44**	.77*	.49**	1	-.024
8. Age	.08	-.10*	-.04	-.11*	-.10*	-.07	-.02	1

*p <.01, **p <.001

Table 3. Elite athlete, recreation sport, and non-sport, participants' M ± SD depression scores across females and males.

Sex	Group		
	Non-sport	Recreational	Elite
Females	19.80 ± 5.06	19.05 ± 5.48	17.44 ± 5.86*
Males	18.36 ± 5.21	17.81 ± 6.07	15.30 ± 4.92

Note. *$p < .04$ larger score than elite male athletes

Table 4. Regression effects (R^2Change), *F* values, Bootstrapped Standardized confidence intervals (CIs), and Sobel Tests for each mediation analysis conducted.

** $p < .001$

Model	Variables			*c* path	*a* path	*b* and *c'* path	95% CI mean indirect effect	Sobel Test (*Z*)
	IV	DV	MV					
1	PIB	Anxiety	LFT	F (3, 418) = 19.97, R^2 = .13**	F (3, 418) = 77.64, R^2 = .33**	F (4, 417) = 15.94, R^2 = .14**	.00 - .11	1.82 NS
2	PIB	Anxiety	AWF	F (3, 418) = 19.97, R^2 = .13**	F (3, 418) = 113.38, R^2 = .42**	F (4, 417) = 23.21, R^2 = .19**	.12 - .28	4.95**
3	PIB	Anxiety	DEP	F (3, 418) = 19.97, R^2 = .13**	F (3, 418) = 25.38, R^2 = .16**	F (4, 417) =36.17, R^2 = .26**	.08 - .19	5.20**
4	PIB	Anger	LFT	F (3, 418) = 12.20, R^2 = .08**	F (3, 418) = 77.64, R^2 = .33**	F (4, 417) = 14.67, R^2 = .12**	.06 - .19	3.67**
5	PIB	Anger	AWF	F (3, 418) = 12.20, R^2 = .08**	F (3, 418) = 113.38, R^2 = .42**	F (4, 417) = 18.21, R^2 = .15**	.14 - .30	5.09**
6	PIB	Anger	DEP	F (3, 418) = 12.20, R^2 = .08**	F (3, 418) = 25.38, R^2 = .16**	F (4, 417) = 27.82, R^2 = .23**	.09 - .19	5.33**
7	PIB	Depression	LFT	F (3, 418) = 3.72, R^2 = .02*	F (3, 418) = 77.64, R^2 = .33**	F (4, 417) = 3.11, R^2 = .03*	-.03 - .10	1.17NS
8	PIB	Depression	AWF	F (3, 418) = 3.72, R^2 = .02*	F (3, 418) = 113.38, R^2 = .42**	F (4, 417) = 10.01, R^2 = .09**	.14 - .30	5.13**
9	PIB	Depression	DEP	F (3, 418) = 3.72, R^2 = .02*	F (3, 418) = 25.38, R^2 = .16**	F (4, 417) = 20.45, R^2 = .19**	.10 - .21	5.30**

* $p < .05$

NS $p > .05$

Figure 3. Mediational diagrams for models testing the interrelations among PIB, LFT, AWF, and DEP, with anger as the outcome variable. Values (standardized) above lines reflect bivariate (β) relations, and values below lines reflect multivariate relations accounting for other predictors in the regression equation. All associations are significant (*$p < .05$, **$p < .001$, *NS* = non-significant).

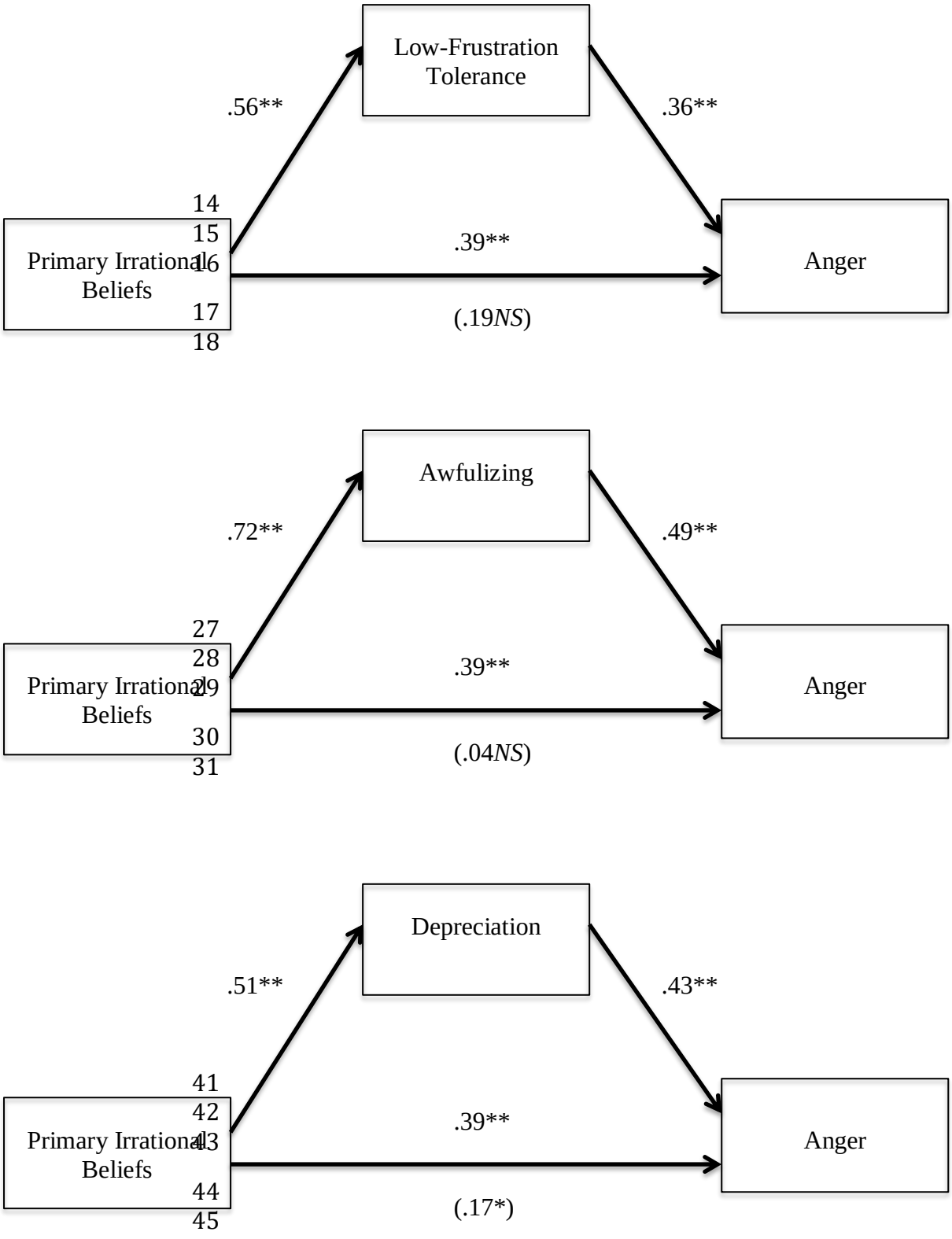

Figure 4. Mediational diagrams for models testing the interrelations among PIB, LFT, AWF, and DEP, with depression as the outcome variable. Values (standardized) above lines reflect bivariate (β) relations, and values below lines reflect multivariate relations accounting for other predictors in the regression equation. All associations are significant (*$p < .05$, **$p < .001$, *NS* = non-significant).

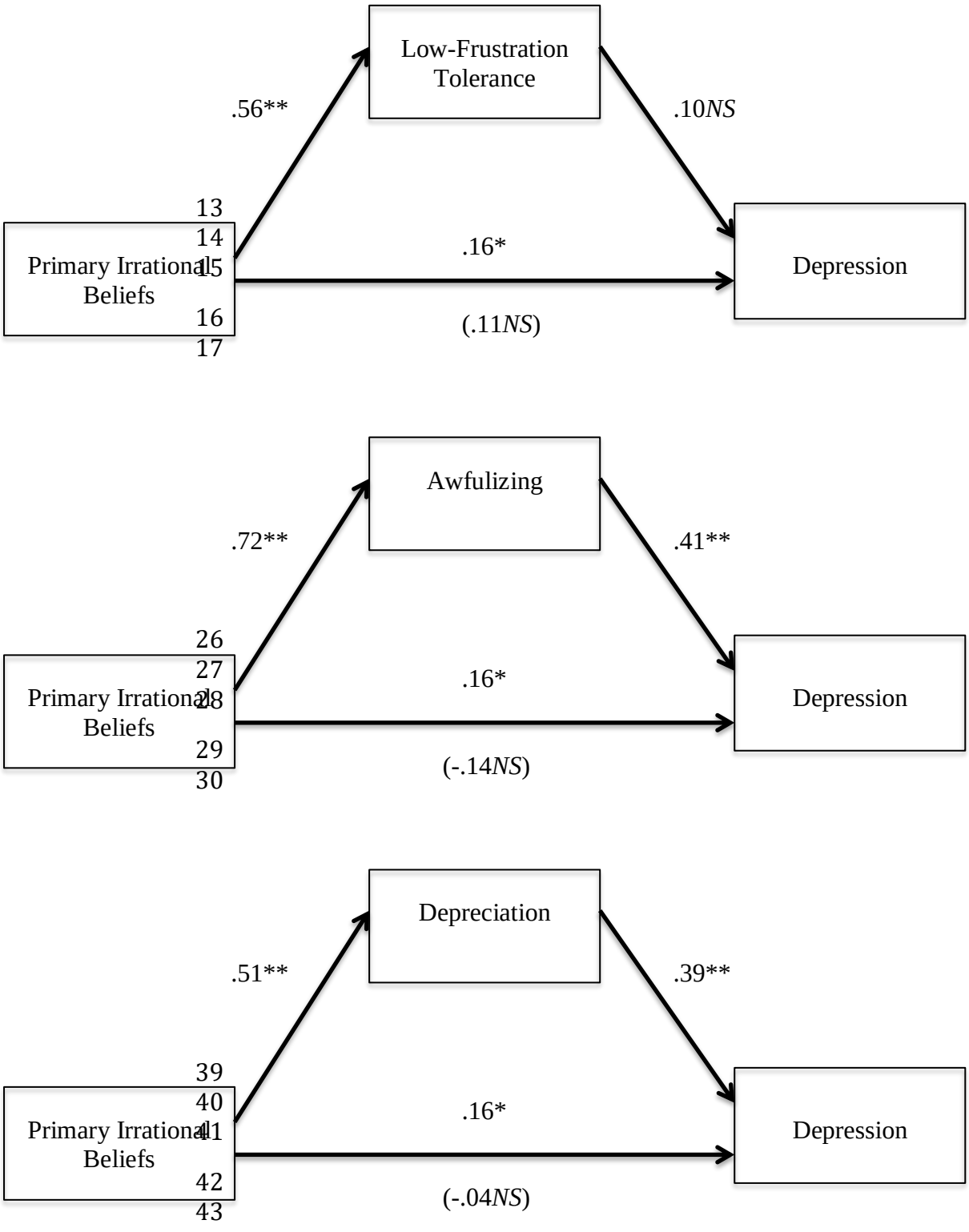

Figure 2. Mediational diagrams for models testing the interrelations among PIB, LFT, AWF, and DEP, with anxiety as the outcome variable. Values (standardized) above lines reflect bivariate (β) relations, and values below lines reflect multivariate relations accounting for other predictors in the regression equation. All associations are significant (*$p < .05$, **$p < .001$).