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10   Maladaptive schema as a potential mechanism through which irrational beliefs relate to

11   psychological distress in athletes.

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2   Abstract

3   **Objectives**

4   The psychological wellbeing of athletes, in particular the concept of psychological distress, is

5   receiving growing research attention. Irrational beliefs as proposed in Rational Emotive

6   Behaviour Therapy (REBT) have been shown to be positively related to the psychological

7   distress of athletes, but the mechanisms by which irrational beliefs predict psychological

8   distress remain unclear. The role of maladaptive schema, as proposed in Schema Therapy

9   (ST), in the relationship between irrational beliefs and psychological distress has not yet been

10   studied, despite the conceptual similarities between REBT and ST.

11   **Design and method**

12   Participants were self-selected triathletes ($n = 124$), duathletes ($n = 9$), swimmers ($n = 7$),

13   cyclists ($n = 17$) and runners ($n = 57$). A single timepoint cross-sectional study design was

14   used to investigate simple mediation models using the PROCESS macro.

15   **Results**

16   Results revealed that maladaptive schema fully mediated the positive relationship between

17   irrational beliefs and symptoms of anxiety, and depression.

18   **Conclusions**

19   These findings suggest that maladaptive schema is a potential mechanism through which

20   irrational beliefs predict psychological distress. Results may help practitioners begin to

21   understand how REBT and ST may be applied in tandem for the benefit of greater athlete

22   psychological wellbeing.

23   *Keywords*: CBT; emotion; sport; triathlete; duathlete

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1   Maladaptive schema as a potential mechanism through which irrational beliefs relate to

2   psychological distress in athletes.

3   Psychological distress is "a state of emotional suffering characterized by symptoms of

4   depression and anxiety" (Drapeau, Marchand, & Beaulieu-Prévost, 2012, p.105).

5   Psychological distress negatively impacts on individuals' social functioning and day-to-day

6   living (Wheaton, 2007), is a criterion for some psychological disorders (e.g., major

7   depression; generalized anxiety disorder; Paukert et al., 2009; Watson 2009). The prevalence

8   of psychological distress it is thought to range between 5% and 27% in the general population

9   (Benzeval & Judge, 2001; Chittleborough et al., 2011; Gispert et al., 2003; Kuriyama et al.

10   2009), reaching higher levels in populations exposed to specific risk factors such as stressful

11   work conditions (e.g., Marchand, Demers, & Durand 2005). Hence, psychological distress is

12   an important construct to examine in athlete populations, because the athletic context is rife

13   with high demands and pressure (Fletcher & Arnold, 2017; Hughes & Leavey, 2012; Nixdorf,

14   Frank, Hautzinger, & Beckmann, 2013), and taking part in sport at an elite level may present

15   some mental health risks. A systematic review concerning the mental health of elite athletes

16   (Rice et al., 2016) showed that major life events, including injury, were associated with

17   higher rates of distress, anxiety, and depression. Rice et al. (2016) report depression

18   prevalence rates for elite athletes of up to 34% (Armstrong & Oomen-Early, 2009; Hammond

19   et al., 2013), and depression and anxiety combined (psychological distress) of up to 26%

20   (Gouttebarge, Frings-Dresen, & Sluite, 2015). However, depression prevalence rates have

21   also been as low as 15% (Nixdorf et al., 2013), with population demographics, method of

22   assessment, and sample size, varying across studies.

23   Given that the objectives of many published studies of psychological distress are

24   essentially descriptive (Drapeau et al., 2012), there is a dearth in research concerning the

25   cognitive antecedents of psychological distress, particularly in athlete populations. When

1 viewed through a cognitive-behavioural lens, it is not yet fully understood whether and to

2 what extent cognitive mediators (e.g., thoughts, attitudes, and beliefs) are involved in the

3 mental health of athletes. The extant research in sport indicates that contextual factors are

4 predictive of psychological distress (Fletcher, Hanton, & Wagstaff, 2012; Hughes & Leavey,

5 2012; Nixdorf et al., 2013), but cognitive-behavioural approaches maintain that it is not

6 events that cause emotional reactivity, rather, a transaction occurs between the environment

7 and emotions through cognitive mediation (Fletcher, Hanton, & Mellalieu, 2006; Turner,

8 2016). One cognitive-behavioural approach to mental health that incorporates this

9 transactional viewpoint and has garnered growing interest in sport literature (e.g., Turner &

10 Bennett, 2018), is Rational Emotive Behaviour Therapy (REBT; Ellis, 1957).

11   In REBT it is not an event that causes psychological distress, but the beliefs that one

12 has about that event that causes psychological distress. In REBT there is an emphasis on

13 individuals' beliefs (rigid, extreme, and illogical; Dryden, 2009) about events as a risk factor

14 for psychological distress, rather than the adversity or stressor alone. Irrational beliefs

15 comprise a primary irrational belief and three secondary beliefs (awfulizing, low frustration

16 tolerance, and depreciation). Much research indicates that high irrational beliefs are

17 positively related to psychological distress (e.g., Browne, Dowd, & Freeman, 2010; Vîslă,

18 Fluckiger, Holtforth, & David, 2015), and one study has reported a positive relationship

19 between irrational beliefs and psychological distress in athletes (Turner, Carrington, &

20 Miller, 2019), and another reported that irrational beliefs predicted increases in burnout in

21 Gaelic footballers (Turner & Moore, 2015). Additional research in athletic populations

22 needed to further investigate these initial findings. A greater understanding of how irrational

23 beliefs relate to psychological distress in athletes is important because REBT offers a

24 potentially effective approach to helping athletes to reduce psychological distress (Turner,

1   2016; Wood, Turner, & Barker, 2018), but due to scant research, the confident application of

2   REBT as an intervention for athlete psychological distress cannot be extolled.

3   The National Institute for Health and Care Excellence (NICE) in the United Kingdom,

4   guidelines for anxiety (NICE, 2011) and depression (NICE, 2016) both recommend

5   Cognitive Behavioural Therapy (CBT) as treatment. CBT is a family of therapies in which a

6   variety of approaches are presented, such as Cognitive Therapy (CT; Beck 1976), Acceptance

7   and Commitment Therapy (ACT; Hayes, 2018), REBT (Ellis, 1957), and Schema Therapy

8   (ST; Young, 1999). As such, it is reasonable to hypothesise that all of these CBTs can be

9   effective in athletes experiencing psychological distress, depending on the idiosyncrasies of

10   the athlete and the context, and that these approaches are not mutually exclusive. In REBT

11   theory, irrational beliefs are hypothesized to lead to automatic thoughts (e.g., Ellis 1994;

12   Beck 2008), and REBT and CT share some similar conceptual and practical ideas (Ellis,

13   2005). Some past research has elucidated mechanisms that are represented in other CBTs

14   through which irrational beliefs, as proposed within REBT, may predict psychological

15   distress. For example, research indicates that irrational beliefs and automatic thoughts, as

16   proposed in CT (Beck, 1976) may co-occur to atemporally predict psychological distress

17   (e.g., Buschmann, Horn, Blankenship, Garcia, & Bohan, 2018; Szentagotai & Freeman,

18   2007). This initial research has generated a need to further investigate how irrational beliefs

19   and cognitive constructs from other CBTs co-occur to predict psychological distress (David

20   & Szentagotai, 2006).

21   One CBT that has sparsely been investigated in sport literature is ST, which is

22   surprising given the that the core constructs of ST (maladaptive schemas) are salient to the

23   pursuit of personal goals. Maladaptive schemas are defined as "extremely stable and enduring

24   themes that develop during childhood, are elaborated throughout an individual's lifetime, and

25   are dysfunctional to a significant degree. These schemas serve as templates for the processing

1   of later experience" (Young, 1999, p. 9). Maladaptive schemas are character traits (see

2   Young et al., 2003), that develop through a lack of fit between a child's natural

3   developmental needs and their environment which should provide for those needs. A lack of

4   fit means the child's needs are not sufficiently met and maladaptive schemas are the

5   consequence of the child's attempt to cope with this deficit (Linehan, 1993). In adulthood

6   these schemas are activated in relevant situations and result in dysfunctional perceptions that

7   govern the way a person sees themselves, others, and the world in that moment.

8   Of particular relevance to athletes are the maladaptive schemas of unrelenting

9   standards, failure to achieve, and defectiveness. Unrelenting standards reflect a belief that

10   "one must strive to meet" (Ohanian & Rashed, 2012, p.172) very high internalized standards

11   of behaviour and performance (Young et al., 2003). Defectiveness is described as the feeling

12   that there is something wrong with you (Young et al., 2003), and failure to achieve reflects

13   the belief that one is fundamentally inadequate in areas of achievement (Ohanian & Rashed,

14   2012). Of the very sparse literature, one known study of handball and rugby players

15   (Gherghişan, 2015) found that unrelenting standards was particularly high across the samples.

16   Gherghişan (2015) also suggests that competitive environments may trigger maladaptive

17   schema due to the emotional nature of competition, and the recalling of past experiences. In

18   non-athletic samples, unrelenting standards is one of the most often endorsed schemas

19   (Rijkeboer, Van den Bergh, & Van den Bout, 2005; Waller, Meyer, & Ohanian, 2001).

20   Not only are maladaptive schemas potential relevant for athletes, they may co-occur

21   with known associates of psychological distress to help explain the occurrence of athlete

22   psychological distress. Specifically, some researchers suggest that maladaptive schemas and

23   irrational beliefs share some conceptual characteristics (Sava, 2009; Szentagotai, Schnur,

24   DiGiuseppe, Macavei, Kallay, & David, 2005), whilst others indicate that some irrational

25   beliefs might be better thought of as schemas (DiGuiseppe, 1996). However, there is little

1   existing evidence to support the notion that irrational beliefs and maladaptive schemas are

2   positively related, and there are some conceptual differences that cast doubt on their supposed

3   similarities. For example, irrational beliefs are considered to be 'irrational' because they are

4   rigid, extreme, and illogical (Turner, 2016). These adjectives that are not associated with

5   maladaptive schemas in the revised and comprehensive definition of maladaptive schemas

6   (Young et al., 2013). In addition, although Sava (2009) posited that unrelenting standards are

7   similar to primary irrational beliefs, chiefly because both contain rigid demands on the self,

8   the data did not support this assertion. It could be argued that the maladaptive schemas

9   defectiveness (e.g., "there is something wrong with me") and failure to achieve (e.g., "I have

10   achieved nothing") are similar to the irrational belief of depreciation (e.g., "I am complete

11   failure"), as they all reflect an extreme negative view of the self (e.g., Young et al., 2003).

12   But apart from semantic similarities, there is no evidence to suggest that irrational beliefs and

13   maladaptive schemas are related. Whilst REBT and ST share a common taxonomy (both are

14   CBTs), each proposes different cognitive factors causing psychological distress, and in line

15   with this fact, there are differences in their affective mechanisms, and as a result, their core

16   therapeutic processes.

17   One common feature that irrational beliefs and maladaptive schemas do share, is that

18   they are both positively related to greater psychological distress. In particular, maladaptive

19   schema 'failure to achieve' and 'defectiveness' have been found to be positively related to

20   psychological distress (e.g., Calvete et al., 2005; Muris, 2006). Research has yet to examine

21   whether these findings remain in athlete samples. The aforementioned relationship between

22   irrational beliefs and psychological distress (Visla et al., 2016) have been supported in athlete

23   samples (Turner et al., 2019). But no research has examined the co-occurrence of irrational

24   beliefs and maladaptive schemas to predict psychological distress. In sum, there is some

25   debate concerning the conceptual similarities between irrational beliefs and maladaptive

1   schema that have sparsely been investigated, and whilst the research examining REBT and

2   irrational beliefs in sport is burgeoning (e.g., Turner & Bennet, 2018), the theory and practice

3   of ST in sport remains relatively unexplored. A deeper understanding of whether and to what

4   extent irrational beliefs and maladaptive schemas co-occur to predict psychological distress

5   may offer a more complex understanding of mental health risk factors in athletes, and help

6   practitioners begin to understand how REBT and ST may be applied in tandem for the benefit

7   of greater athlete psychological wellbeing.

8   The purpose of the current study is to consider irrational beliefs and maladaptive

9   schema in relation to psychological distress in a sample of athletes participating in one or all

10   of the sports of running, cycling, and swimming (e.g., duathletes, and triathletes). We seek to

11   understand the conceptual linkage between irrational beliefs and maladaptive schema, and

12   how they interact to relate to athlete psychological distress, for the first time in research.

13   Cognitions do not exist within a vacuum, and constructs from difference CBTs can co-occur

14   (e.g., Buschmann et al., 2018) to explain psychological distress. Therefore, the aims of the

15   current study were twofold. First, we examined associations between the four core irrational

16   beliefs and maladaptive schemas (defectiveness, failure to achieve, and unrelenting

17   standards), a seldom undertaken endeavour. Second, we examined the effects of irrational

18   beliefs and maladaptive schemas on anxiety and depression symptomology (psychological

19   distress). It is not known, nor has it been it postulated, about the extent to which irrational

20   beliefs and maladaptive schemas co-occur to relate to athlete psychological distress. The

21   current study has one main hypothesis and an exploratory hypothesis. First, it was tentatively

22   hypothesised that the four core irrational beliefs would be positively related to all three

23   maladaptive schemas. Second, due to the novel and exploratory nature of the current study,

24   we made an exploratory hypothesis concerning the co-occurrence of irrational beliefs and

25   maladaptive schema, and the interaction between these two constructs in the atemporal

1   prediction of psychological distress. On the basis of past research findings that automatic

2   thoughts account for the effect of irrational beliefs on distress in a mediation model

3   (Buschmann et al., 2018), we expected maladaptive schema to account for the effect of

4   irrational beliefs on athletes psychological distress.

5   **Method**

6   **Participants**

7   Participants were 214 (*female* = 94) self-selected competitive triathletes (n = 124),

8   runners (n = 57), duathletes (n = 9), cyclists (n = 17), and swimmers (n = 7), who ranged in

9   age from 18 to 72 (*Mage* = 42.24, *SDage* = 10.54) based in the United Kingdom. 78 athletes

10   (*female* = 33) competed at club/regional level for an average of 3.40 years (*SD* = 2.60), 74

11   athletes (*female* = 28) competed at national level for an average of 4.20 years (*SD* = 3.00),

12   and 62 athletes (*female* = 33) competed at international level for an average of 5.60 years (*SD*

13   = 3.50). Females competed at their highest level for an average of 4.60 years (*SD* = 3.20), and

14   males competed at their highest level for an average of 3.90 years (*SD* = 3.10).

15   **Design**

16   A single timepoint cross-sectional study design was used to investigate simple

17   atemporal mediation models. The tested models were constructed in line with cognitive

18   behavioral theory (REBT and ST), such that psychological distress (anxiety and depression)

19   functioned as the Y variable, whilst irrational beliefs and maladaptive schema functioned as

20   either the X of M variable. The models tested in the current study reflect the extent literature,

21   and the temporal order of the included variables is not ambiguous. However, the current

22   methodology does not include a temporal component, and therefore does not test cause and

23   effect, rather, we examine atemporal mediation effects (e.g., Winer, Cervone, Bryant,

24   McKinney, Liu, & Nadorff, 2016).

25   **Measures**

1   **Irrational Beliefs.** The irrational Performance Beliefs Inventory (iPBI; Turner et al.,

2   2018) is a measure of irrational beliefs in performance settings such as sport and in line with

3   REBT theory assesses four core irrational beliefs, namely primary irrational beliefs (e.g., "I

4   need others to think that I make a valuable contribution"), low-frustration tolerance (e.g., I

5   can't stand not reaching my goals"), awfulizing (e.g., "It's awful to not be treated fairly by

6   my peers"), and depreciation (e.g., "I am a loser if I do not succeed in things that matter to

7   me"). The iPBI comprises 28-items, 7-items for each core irrational beliefs. Items are rated

8   on a Likert-scale from 1 (*strongly disagree*) to 5 (*strongly agree*) with higher scores

9   indicating greater irrational beliefs. The four subscales were summed and averaged to form a

10   composite irrational beliefs variable (Turner et al., 2018). The iPBI is valid and reliable for

11   use with athletes (Turner et al., 2019; Turner & Allen, 2018), and internal consistency

12   (Cronbach's alpha) in the current sample was between .75 and .88 for the four subscales

13   which shows good internal reliability and .93 for the composite score demonstrating excellent

14   internal reliability.

15   **Maladaptive schemas.** Three subscales, defectiveness, failure to achieve, and

16   unrelenting standards, were used from the full Young Schema Questionnaire (YSQ; Young,

17   2005); YSQ-S3 (Welburn, Coristine, Dagg, Pontefract, & Jordan, 2002). The YSQ has been

18   used with a wide variety of clinical (Calvete et al., 2005; Waller et al., 2001) and non-clinical

19   populations (Rijkeboer, van den Bergh & van den Bout, 2005). Each subscale is assessed

20   using 5-items about attitudes, beliefs, and expectations about the self and others, and

21   participants rated each item on a Likert-scale from 1 (*completely untrue of me*) to 6

22   (*describes me perfectly*). For example, the respondent is asked to respond to items such as

23   "I'm unworthy of the love, attention, and respect of others" (defectiveness), "I'm

24   incompetent when it comes to achievement" (failure to achieve), and "I must be the best at

25   most of what I do; I can't accept second best" (unrelenting standards). The items produce

1   three subscale scores ranging from 5 to 30, with a higher score indicating greater maladaptive

2   schemas. The three subscales were summed and averaged to produce a total maladaptive

3   schema variable for subsequent analyses. Internal consistency (Cronbach's alpha) was

4   between .84 and .91 for the three subscales and .86 for the total score, which shows good

5   internal reliability.

6   **Psychological distress.** In line with recent literature, psychological distress was

7   assessed using two separate and prominent measures of depression and anxiety

8   symptomology. Specifically, the Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, &

9   Williams, 2001) was used to measure depression and is used nationally in NHS Increasing

10 Access to Psychological Therapies (IAPT) services as a standard measurement and screening

11 tool for depression. The PHQ-9 has 9-items that assess frequency in symptoms of depression

12 over the last two weeks, rated on a Likert-scale from 0 (*not at all*) to 3 (*nearly every day*). For

13 example, one item asks how often the respondent has been "feeling down, depressed, or

14 hopeless". The items produce a total score between 0-27, with a higher score indicating

15 greater depression symptoms. The range in PHQ-9 data was 0-12, and internal consistency

16 (Cronbach's alpha) was .85 showing good internal reliability.

17   The General Anxiety Disorder Questionnaire (GAD-7; Spitzer, Kroenke, Williams &

18 Lowe, 2006) was used to measure anxiety symptoms. Similar to the PHQ-9, the GAD-7 is

19 used in NHS IAPT services as a standard measurement and screening tool for anxiety. The

20 GAD-7 comprises 7-items that assess frequency of anxiety symptoms over the last two weeks

21 rated on a Likert-scale from 0 (*not at all*) to 3 (*nearly every day*). For example, one item asks

22 how often the respondent has been "feeling nervous, anxious, or on the edge". The items

23 produce a total score between 0 – 21, with a higher score indicating greater anxiety

24 symptoms. The range in PHQ-9 data was 0-11, and internal consistency (Cronbach's alpha)

25 was .89 showing good internal reliability. The total scores from the PHQ-9 and the GAD-7

1   were combined, known as the PHQ-ADS (e.g., Chilcot et al., 2018; Kroenke et al., 2016), to

2   form a single psychological distress variable.

3   **Procedure**

4   Participants were recruited using convenience, snowball, and random sampling via

5   social media. Convenience sampling was achieved by liaising with U.K. sport and exercise

6   psychologists and researchers to gain access to athlete groups with whom they worked.

7   Snowball sampling was achieved by encouraging participants, on completion of the survey,

8   to send the details of the study to other potential participants that may or may not take part in

9   sport. Random sampling was achieved via a social media campaign targeting sporting

10   organizations to engage their athletes in the project. We adopted multiple sample recruitment

11   devices to limit self-selection and sampling biases associated with a single approach to

12   sample recruitment. The four questionnaires (iPBI, YSQ-S3, PHQ-9, and GAD-7), along with

13   demographics questions (age, sex, sport competed, and current level), were distributed to

14   participants interested in taking part using the online survey platform Qualtrics. Research has

15   shown that online versions of questionnaires have the same psychometric properties as paper

16   versions (Riva, Teruzzi, & Anolli, 2003), but also allow data to be collected nationally and

17   multi-nationally.

18   The first page of the survey gave participants information about the study, and the

19   type of participants required. Participants needed to agree with a description of people being

20   competitive in sport, rather than just taking part, to continue. The next three questions

21   ensured that participants were eligible to take part. If they answered that they were under 18,

22   had a mental health problem, or did not consent to their data being used for research, they

23   automatically directed to the end thank you page. After giving consent to take part,

24   participants completed the questionnaire, after which they were thanked and then signposted

25   to independent support services in case the questionnaire triggered some discomfort around

1   psychological distress. Ethical approval was gained from a University Ethics Board and

2   informed consent was gained from all participants prior to all data collection. All procedures

3   in line with the ethical standards of the Helsinki Declaration.

4   **Analytic strategy**

5   In order to determine the sample size for mediation analyses, a power analysis was

6   conducted using G*Power (Faul, Erfelder, Bucnhner, & Lang, 2014). The analysis was based

7   off multiple linear regression, with a small-medium effect size (f^2) of .30 (consistent with past

8   research; Calvete et al., 2005), an alpha of .05, a standard power level of .80, and a total of 2

9   predictors. The results of the power analysis showed that a minimum of 36 participants would

10   be needed for each of the six tests (n = 216 total) for an appropriate power level.

11   Collected data were first screened for missing values, normality, and outliers. Missing

12   data (0.1%) were replaced using SPSS expectation maximisation. Although Kolmagorov-

13   Smirnov tests were significant, given the large sample size in the current study, the Central

14   Limit Theorem was applied to assume normality of the data. The data were checked for

15   normality and outliers more than two standard deviations from the mean (4%) were

16   Windsorized (Reifman & Keyton, 2010; Smith, 2011). Main data analyses were conducted in

17   two phases. First, Pearson's correlation analyses were conducted to examine the bivariate

18   associations between all self-report variables (Table 1).

19   Second, following similar research (e.g., Buschmann et al., 2018) simple atemporal

20   mediation analyses were conducted (*n* = 6 models), one for each combination of mediators.

21   To achieve this, irrational beliefs and maladaptive schemas are tested in simple atemporal

22   mediation (Winer et al., 2016) models to examine maladaptive schema as a potential

23   mechanism through which irrational beliefs are related to psychological distress in the present

24   athlete sample. The atemporal mediation analyses conducted in the current study follow the

25   models presented by Szentagotai and Freeman (2007) and Buschmann et al. (2018). In the

1   present study, the extent to which maladaptive schema account for the already distinguished

2   relationship between irrational beliefs and psychological distress (Turner et al., 2019), is

3   examined in an athlete sample. Importantly, alternate analyses test the atemporal mediational

4   effects of irrational beliefs on the, as yet to be determined, relationship between maladaptive

5   schemas and psychological distress in athlete populations. That is, we conducted three

6   mediation analyses in which maladaptive schemas acted as the mediator between irrational

7   beliefs and anxiety (model 1), depression (model 2), and psychological distress (model 5),

8   and three mediation analyses in which irrational beliefs acted as the mediator between

9   maladaptive schemas and anxiety (model 3), depression (model 4), and psychological distress

10   (model 6). Due to the range of athlete levels and ages in the current sample, age and

11   competitive level were entered into each model as covariates (e.g., Turner et al., 2019).

12   For mediation analyses, we used the PROCESS macro (model 4; Hayes, 2013) in

13   IBM SPSS was used. A bootstrapping procedure (with bias corrected confidence intervals

14   [CI]) was performed to estimate indirect effects (Preacher & Hayes, 2008). The bootstrapping

15   process involved 5,000 resamples and statistical significance of indirect effects was

16   determined using 95% CIs. Recent research has used PROCESS to conduct simple atemporal

17   mediation analyses with irrational beliefs and psychological distress (Turner et al., 2019).

18   **Results**

19   **Relationships between irrational beliefs and maladaptive schema**

20   Pearson's correlation co-efficients (Table 1) revealed that the only non-significant

21   associations were between PIB and defectiveness, PIB and failure to achieve, and failure to

22   achieve and unrelating standards. Importantly for the mediation analyses, composite irrational

23   beliefs were positively and significantly related to total maladaptive schema, anxiety, and

24   depression, and in addition, total maladaptive schema was positively and significantly related

1   to anxiety, and depression. Subsequently, four simple mediation analyses were conducted

2   (Table 2).

3   **Co-occurrence of irrational beliefs and maladaptive schema in relation to psychological**

4   **distress**

5   For Models 1, 2, and 5 (Figures 1a, 1b, and 1e) there was a significant overall effect,

6   and a significant indirect effect, indicating that total maladaptive schema significantly

7   mediated the relationship between composite irrational beliefs and anxiety ($\beta = .14$, CI: .061,

8   .231), depression ($\beta = .18$, CI: .107, .271), and psychological distress ($\beta = .17$, CI: .097,

9   .255). In essence, the models in which maladaptive schema acted as the mediator between

10   irrational beliefs and psychological distress, significant mediation was revealed. The analyses

11   showed that whilst irrational beliefs were positively (with a moderate effect; Preacher &

12   Kelly, 2011) related to psychological distress, the addition of maladaptive schema weakened

13   (to non-significance, and small effects) the association between irrational beliefs and

14   psychological distress.

15   For Models 3, 4, and 6 (Figures 1c, 1d, and 1f) there was a significant overall effect,

16   but no significant indirect effects emerged, indicating that composite irrational beliefs did not

17   significantly mediate the relationship between total maladaptive schema and anxiety ($\beta = .05$,

18   CI: -.019, .119), depression ($\beta = .04$, CI: -.027, .113), and psychological distress ($\beta = .05$, CI:

19   -.015, .119). In essence, the models in which irrational beliefs acted as the mediator between

20   maladaptive schema and psychological distress, significant mediation was not revealed. The

21   analyses showed that maladaptive schema was positively (with a moderate-large effect)

22   related to psychological distress, the addition of irrational beliefs did not significantly weaken

23   (to non-significance) the moderate-large association between maladaptive schema and

24   psychological distress.

25   **Discussion**

1   The main aim of the current study was to explore the extent to which irrational beliefs and

2   maladaptive schema co-occur to relate to psychological distress. Based on past research

3   investigating the role of automatic thoughts in the relationship between irrational beliefs and

4   psychological distress (Buschmann et al., 2018; Szentagotai & Freeman, 2007) we expected

5   maladaptive schema to account for the relationship between irrational beliefs and

6   psychological distress in the current sample. To test this hypothesis, we conducted two sets of

7   simple atemporal mediation models. One set included maladaptive schema as the mediator

8   variable between irrational beliefs (X) and psychological distress (Y; anxiety and depression

9   separately, and combined), and one set included irrational beliefs as the mediator variable

10   between maladaptive schema (X) and psychological distress (Y; anxiety and depression

11   separately, and combined). We also examined associations between irrational beliefs and

12   maladaptive schemas, and the between-subjects differences between females and males

13   across irrational beliefs, maladaptive schemas, and psychological distress. It was

14   hypothesised that the four core irrational beliefs would be positively related to the three

15   maladaptive schemas.

16   Results demonstrated that maladaptive schema fully atemporally mediated the

17   positive moderate relationship between irrational beliefs and symptoms of anxiety, and

18   depression. That is, whilst irrational beliefs were positively related to psychological distress,

19   the addition of maladaptive schema weakened (to non-significance) the association between

20   irrational beliefs and psychological distress. Findings demonstrated that participants who

21   reported high irrational beliefs also reported high maladaptive schema, and that this

22   association demonstrated a large effect. Importantly, it is the shared variance between

23   irrational beliefs and maladaptive schema that is more strongly related to psychological

24   distress, rather than irrational beliefs alone. That is, with maladaptive schema in the models,

25   there was little evidence that irrational beliefs influenced anxiety and depression, as the effect

1   was reduced from a moderate to a small, non-significant, effect. The direct effects between

2   irrational beliefs and anxiety and depression were moderate and significant, supporting

3   swathes of past research with general and clinical samples (see Visla et al., 2016, for a meta-

4   analysis) and some recent research with athletes (Turner et al., 2019). But the current study

5   suggests that the positive relationship between irrational beliefs and psychological distress is

6   explained through maladaptive schema. This is important because it reveals that maladaptive

7   schema is a potential mechanism through which irrational beliefs are related to psychological

8   distress, a finding demonstrated in past research but with automatic thoughts (e.g.,

9   Buschmann et al., 2018) rather than maladaptive schema. Indeed, irrational beliefs and

10   maladaptive schema explained 44% of variance in psychological distress, which is

11   comparable to Buschmann et al. (2018) who reported that irrational beliefs and automatic

12   thoughts explained 56% of variance in depression. Therefore, maladaptive schema and

13   automatic thoughts appears to be important mechanisms through which irrational beliefs

14   relate to psychological distress.

15   The atemporal mediation findings of the current study are potentially important

16   because they suggest a more complex relationship between irrational beliefs and

17   psychological distress, that researchers and practitioners should be mindful of when studying

18   and working with athletes presenting with high anxiety and or depression. In addition, the

19   correlational findings demonstrated significant positive relationships between specific

20   irrational beliefs and specific maladaptive schemas. The moderate positive associations

21   between irrational depreciation beliefs (as proposed in REBT) and maladaptive defectiveness

22   schema (as proposed in ST) are of particular note due to the potential conceptual convergence

23   between these two constructs. Depreciation reflects the global negative evaluation of the self,

24   others and life, such as "because I have failed, I am a complete failure". In comparison,

25   defectiveness reflects beliefs that one is defective, bad, unwanted, inferior, or invalid

1   (Ohanian & Rashed, 2012). Therefore, defectiveness has much in common with depreciation

2   conceptually with their focus on negative, absolute, and global beliefs about the self.

3   Correlational and atemporal mediational analyses suggest that those with greater

4   psychological distress are more likely to also have greater irrational beliefs and maladaptive

5   schemas. Athletes suffering with symptoms of psychological distress require accurate and

6   comprehensive cognitive assessment that, on the basis of the current study, should include

7   both irrational beliefs and maladaptive. When assessing risk factors for psychological distress

8   it is important to understand how cognitions and beliefs interact to predict ill-being. But more

9   importantly, when intervening with psychological distress it may be appropriate to apply ST

10   and REBT in conjunction, in order to address both irrational beliefs and maladaptive schema.

11   There is clearly a difference in how a practitioner would work with an athlete depending on

12   whether REBT or ST is adopted. REBT is more present and future oriented, whilst ST is

13   more about healing past pain. Therefore, an athlete whose psychological distress

14   symptomology stems from depreciation (as proposed in REBT) and defectiveness (as

15   proposed in ST), for example, may require disputation of depreciation as is common in REBT

16   (Turner, 2016), and require the use of rescripting imagery to create a feeling that an unmet

17   childhood need is indeed being met as used in ST (Arntz, 2012). This would involve

18   engaging the athlete in the empirical, logical, and pragmatic socratic challenging of the

19   depreciation belief, as well as encouraging the athlete to change the meaning of emotional

20   memories and images through imagery. Indeed, both REBT and ST include imagery as a

21   valuable technique to engender emotional change, but with fundamental differences. In

22   REBT, rational emotive imagery (REI; Maulstby, 1971) encourages individuals to imagine

23   experiencing the problematic emotion in their minds eye, identify the specific irrational

24   beliefs which are creating the emotions, and to change these to rational beliefs. Whereas in

25   rescripting imagery (in ST), individuals are asked to imagine the memory as vividly as

1   possible, and to imagine that the sequence of events is changed in a direction that the person

2   desires (Arntz, 2012). Here, in REI the core belief is the key focus of change, but in

3   rescripting imagery the perception of events is the key focus of change.

4   This brief example of a dual REBT-ST approach could help the athlete to reduce the

5   irrational beliefs of depreciation and the maladaptive schema of defectiveness. Of course, the

6   work between client and practitioner is more nuanced, and future research could apply an

7   integrated REBT-ST approach with athletes to record and examine its use and effectiveness.

8   In addition, this dual approach is relevant only to athletes expressing both high irrational

9   beliefs and high maladaptive schema. On the evidence of past research, individuals can also

10 present with high irrational beliefs and related automatic thoughts (e.g., Szentagotai &

11 Freeman, 2007) in which case a dual REBT-CT approach to working with the client is

12 perhaps warranted.

13   Future research should explore a model in which irrational beliefs, maladaptive

14 schema, and automatic thoughts co-occur to relate to psychological distress. In order to

15 achieve this model in athlete samples, researchers should consider developing and validating

16 athlete versions of psychometrics that assess maladaptive schema (YSQ-S3), and automatic

17 thoughts (Automatic Thought Questionnaire). Recently, a sport-specific irrational beliefs

18 measure has been developed (iPBI-2; Turner & Allen, 2018), and should be used in future

19 research with athletes. Also, in the current study we did not assess all possible schemas due to

20 the procedural burden this would have placed on participants. Future research could assess

21 more than just defectiveness, failure to achieve, and unrelenting standards to fully understand

22 the prevalence of maladaptive schema in athletes, and their cognitive, emotional, and

23 behavioural associates.

24   Clearly, we cannot infer cause (cognitions) and effect (emotions), as the analyses

25 demonstrate atemporal associations at a single timepoint. Whilst cognitive-behavioural theory

1   and research (e.g., Vîslă et al., 2016) suggests that psychological distress results from

2   maladaptive cognitions, in the current study it may be the case that participants experiencing

3   comparatively high psychological distress harbour maladaptive cognitions as a function,

4   rather than a cause, of their anxiety and depression symptomology. Longitudinal

5   investigations could determine how maladaptive cognitions influence change in

6   psychological distress, and experimental research could more clearly examine the proposed

7   cognitive mechanisms that cause psychological distress (Jose, 2016).

8   In conclusion, in the current study we examined the atemporal mediational effects of

9   maladaptive schema on the relationship between irrational beliefs and psychological distress

10   in a sample of athletes. Results demonstrated that maladaptive schema fully mediated the

11   positive relationship between irrational beliefs and symptoms of psychological distress. This

12   may suggest that maladaptive schema is a potential mechanism through which irrational

13   beliefs are related to psychological distress, a finding demonstrated in past research but with

14   automatic thoughts (e.g., Buschmann et al., 2018) rather than maladaptive schema. Results

15   also revealed some associations between specific irrational beliefs and maladaptive schema

16   that could instigate further research. To develop this study further, a more comprehensive set

17   of maladaptive schema should be measured, longitudinal (temporal) mediation research

18   methods should be adopted, and unified model of irrational beliefs, maladaptive schema, and

19   automatic thoughts should be developed and tested. Practitioners should explore the

20   alignment of REBT and ST in practice and report their findings in scientific literature.

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1 **Compliance with Ethical Standards:**

2 *Ethical approval*: All procedures performed in studies involving human participants were in

3 accordance with the ethical standards of the institutional and/or national research committee

4 and with the 1964 Helsinki declaration and its later amendments or comparable ethical

5 standards.

6

7   Conflicts of Interest

8 **Conflict of Interest:** All authors declare that they have no conflicts of interest.

9

10

11   Highlights

12 • Maladaptive schema have not been examined in relation to irrational beliefs.

13 • The atemporal mediational effect of schema on irrational beliefs and distress is examined.

14 • Maladaptive schema mediated the relationship between irrational beliefs and distress.

15 • Athletes with greater distress had greater irrational beliefs and greater schemas.

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1   Table 1. Pearson's correlation co-efficients for irrational beliefs, maladaptive schemas, and psychological distress (n = 214).

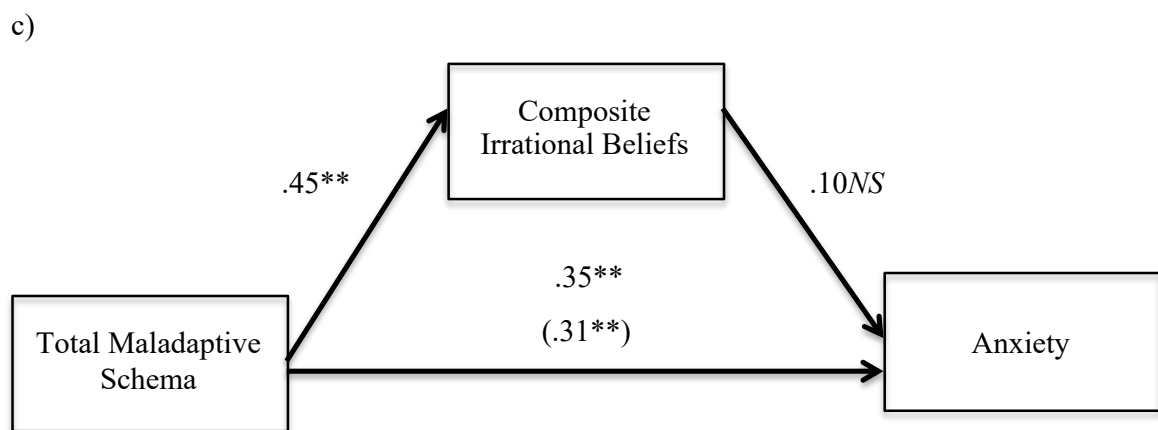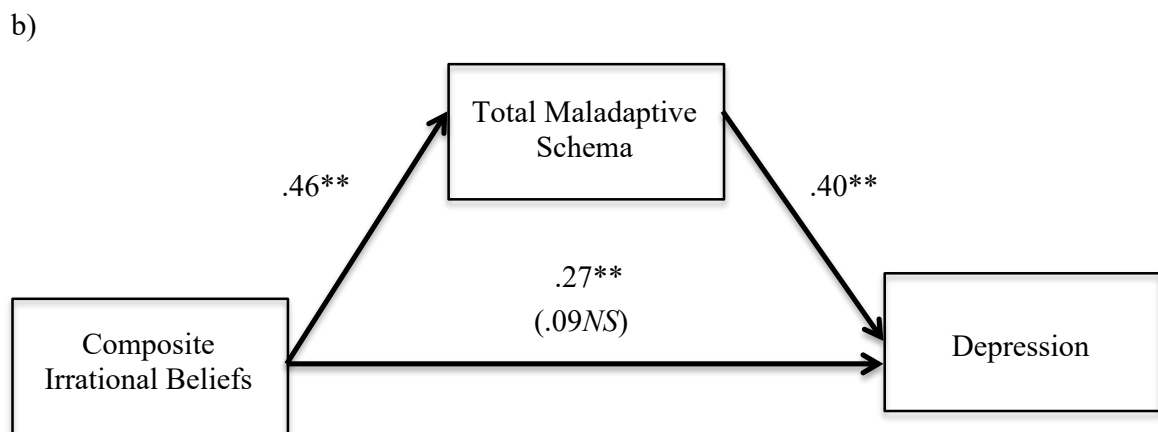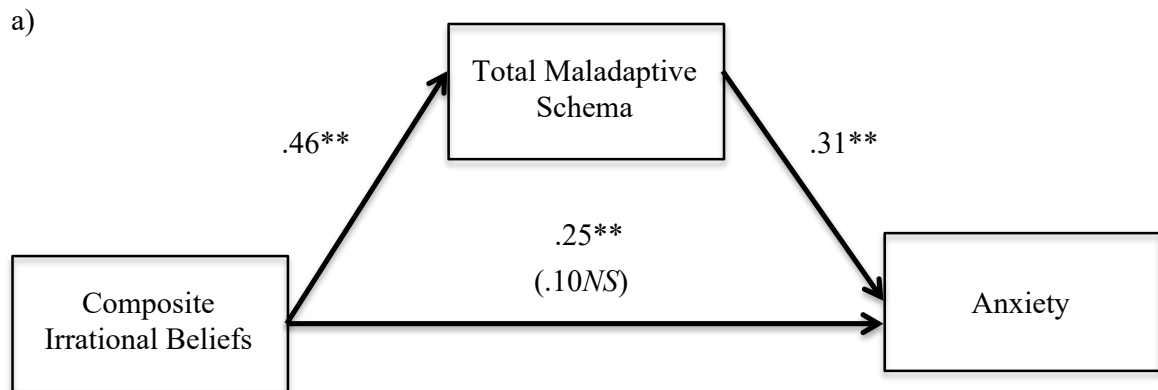|	1	2	3	4	5	6	7	8	9	10	11	Mean(SD)	95 % CI
Primary irrational beliefs (1)	-											26.58(*4.25*)	26 - 27.1
Low frustration tolerance (2)	**.58****	-										26.10(*4.79*)	25.4 - 26.8
Awfulizing (3)	**.82****	**.59****	-									14.53(*5.71*)	13.8 - 15.4
Depreciation (4)	**.47****	**.58****	**.56****	-								22.98(*5.38*)	22.3 - 23.8
Composite irrational beliefs (5)	**.84****	**.82****	**.88****	**.80****	-							22.52(*4.14*)	21.96 - 23.09
Defectiveness (6)	.07	**.14***	**.18***	**.43****	**.26****	-						8.54(*3.56*)	8.1 - 9.2
Failure to achieve (7)	.11	**.14***	**.19****	**.39****	**.26****	**.54****	-					9.38(*4.00*)	8.8 - 9.9
Unrelenting standards (8)	**.36****	**.52****	**.34****	**.32****	**.46***	**.21****	.10	-				20.14(*5.40*)	19.5 - 20.9
Total maladaptive schema (9)	**.28****	**.42****	**.35****	**.52****	**.48****	74**	**.70****	**.71****	-			12.65(*3.01*)	12.24 – 13.06
Anxiety (10)	**.15***	**.21****	**.20****	**.27****	**.48****	**.35****	**.33****	**.16***	**.36****	-		3.38(*3.18*)	2.94 – 3.81
Depression (11)	**.15***	**.24****	**.19****	**.35****	**.29****	**.42****	**.37****	**.24****	**.44****	**.67****	-	3.82(*3.44*)	3.35 – 4.29
Psychological distress (12)	**.15***	**.24****	**.21****	**.33****	**.29****	**.42****	**.37****	**.21****	**.42****	**.90****	**.88****	7.68(*7.35*)	6.69 – 8.68

2   ** $p < .01$ level, * $p < .05$.

3

1   Table 2. Simple mediation analyses between composite irrational beliefs (X) and psychological distress (Y) (models 1, 2, and 5), between

2   total maladaptive schema (X) and psychological distress (Y) (models 3, 4, and 6).

Model Number	(M)	(Y)	YR^2	Total c=t(df)=, P	Direct c'=t(df)=, P	Indirect effect
1	TMS	Anxiety	$R_2 = .38$ $F(4,206) = 8.54$, $P < .001$	.25 t(207) = 3.54, P = .001	.10 $t(206)$ = 1.38, P = .17	.14 [.061 to .231]
2	TMS	Depression	$R_2 = .46$ $F(4,206) = 13.80$, $P < .001$	.27 t(207) = 3.98, $P < .001$	.09 $t(206)$ = 1.23, P = .22	.18 [.107 to .271]
3	CIB	Anxiety	$R_2 = .38$ $F(4,206) = 8.54$, $P < .001$	.35 t(207) = 5.35, $P < .001$	.31 $t(206)$ = 4.14, $P < .001$	.05 [-.019 to .119]
4	CIB	Depression	$R_2 = .46$ $F(4,206) = 13.80$, $P < .001$	.44 t(207) = 6.94, $P < .001$	.40 $t(206)$ = 5.62, $P < .001$	.04 [-.027 to .113]
5	TMS	Distress	$R_2 = .44$ $F(4,206) = 12.21$, $P < .001$	.28 t(207) = 4.03, $P < .001$	.11 $t(206)$ = 1.47, P = .144	.17 [.097 to .255]
6	CIB	Distress	$R_2 = .44$ $F(4,206) = 12.21$, $P < .001$	.42 t(207) = 6.48, $P < .001$	.37 $t(206)$ = 5.12, $P < .001$	.05 [-.015 to .119]

3   *Note*. TMS = total maladaptive schema; CIB = composite irrational beliefs
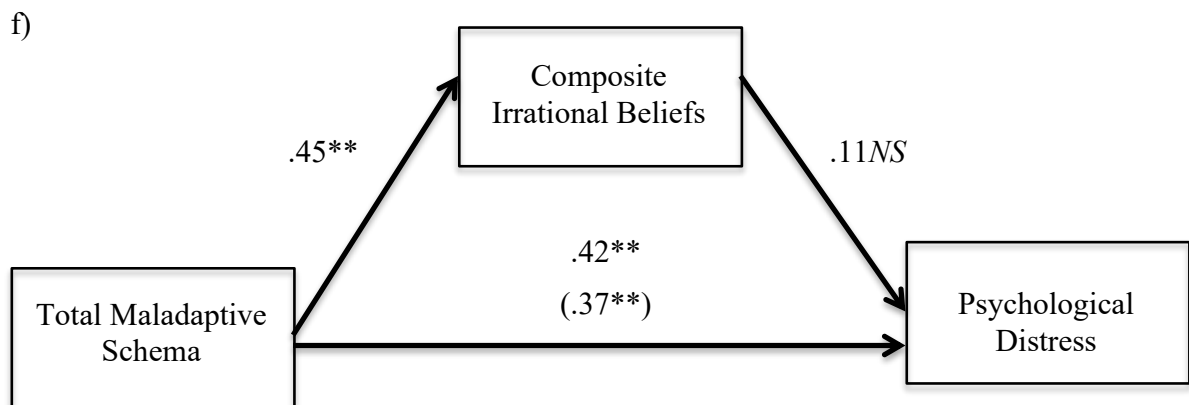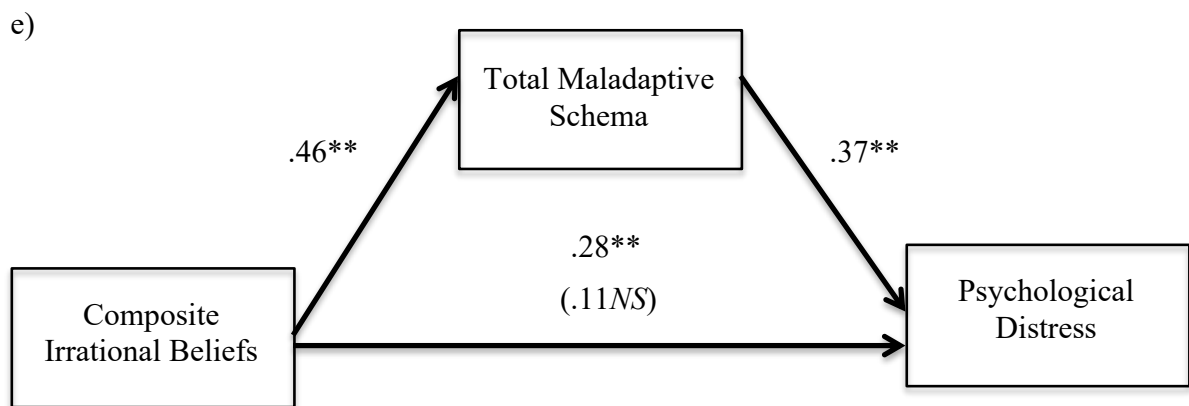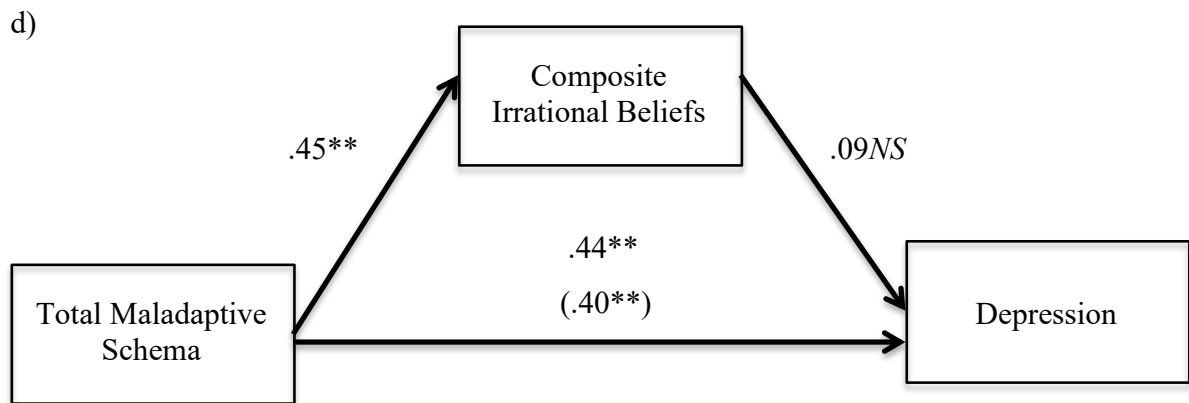
4

5

6

7
8

1   Figure 1. Mediational diagrams for all six models (a, b, c, d, e, f). Values not in parentheses
2   reflect bivariate (*β*) relations, and values in parentheses reflect multivariate relations
3   accounting for other variables in the regression equation. Significance values were at **p <*
4   .05, ***p ≤* .001.
5

a)

b)

c)

6

7

8

d)

Composite
Irrational Beliefs

.45**

.09*NS*

Total Maladaptive
Schema

.44**

(.40**)

Depression

e)

Total Maladaptive
Schema

.46**

.37**

Composite
Irrational Beliefs

.28**

(.11*NS*)

Psychological
Distress

f)

Composite
Irrational Beliefs

.45**

.11*NS*

Total Maladaptive
Schema

.42**

(.37**)

Psychological
Distress

1

2