Mindfulness and burnout in elite junior athletes: The mediating role of experiential avoidance

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Mindfulness and Burnout in Elite Junior Athletes: The Mediating Role of Experiential Avoidance

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Abstract

Previous research suggests that mindfulness and experiential avoidance are negatively and positively related to athlete burnout, respectively. It is unknown, however, whether or not experiential avoidance functions as a mediator between mindfulness and athlete burnout. To address this gap, 387 elite Chinese junior athletes (\(M = 15.44\) years, \(SD = 1.42\)) completed self-report measures of mindfulness, experiential avoidance, and athlete burnout. Findings provided cross-sectional evidence that experiential avoidance mediated the inverse association from mindfulness to each of the three burnout dimensions. No gender difference of these indirect effects were revealed. This study is the first to test the theoretical sequence in which mindfulness is associated with athlete burnout via experiential avoidance, and provide additional support the adaptive nature of mindfulness.

Keywords: acceptance; adolescent athletes; coping; mediation;
Mindfulness and Burnout in Elite Junior Athletes: The Mediating Role of Experiential Avoidance

Elite junior athletes who are at a critical stage of progressing into adult elite athletes are at a high risk for burnout because of the number of stressors they face each day, including prolonged training hours, repeated skills practice, little control in their training schedule and arrangement, daily fatigue, pain, injury, and performance pressure (Gustafsson, Kentta, Hassmén, & Lundqvist, 2007). Athlete burnout is a syndrome that consists of physical and emotional exhaustion from intense demands of training and competing, reduced sense of accomplishment, and devaluation of sport experiences (Raedeke & Smith, 2001). Given the maladaptive nature of these symptoms, a variety of psychological and behavioral problems have been associated with burnout, such as a sickness absence of training, illness, interpersonal problems, and even drop out from sport (Fraser-Thomas, Côté, & Deakin, 2008).

With the aim of alleviating the occurrence of athlete burnout, researchers have sought to examine protective (e.g., harmonious passion, hope, problem-focused coping, and self-determined motivation) and risk (e.g., avoidant coping, stress, negative affect, and socially prescribed perfectionism) factors of athlete burnout (see Curran, Appleton, Hill, & Hall, 2011; Gustafsson, Skoog, Podlog, Lundqvist, & Wagnsson, 2013; Hill, Hall, & Appleton, 2010; Lonsdale, Hodge, & Rose, 2009). Mindfulness, which is defined as a receptive and nonjudgmental present-moment mindful attention and awareness (Brown & Ryan, 2003), is one important protective factor that may offer new insight into the prevention of athlete burnout yet has received little attention from scholars (Gustafsson, Davis, Skoog, Kenttä, & Harberl, 2015).

Given that athlete burnout is proposed to result from an imbalance between chronic stress and a lack of effective coping resources (Raedeke & Smith, 2004), mindfulness could serve as a
key protective factor through which the influence of stress is counterbalanced. This protective hypothesis is proposed since mindfulness allows individuals to simply observe and accept thoughts and feelings during stressful situations without trying to alter the experiences in the present moment (Kabat-Zinn, 1990). In other words, mindfulness helps athletes step back from the experience rather than remaining entangled with an escalated circle of heightened emotional distress (Bishop, 2002). In this sense, mindfulness might influence experiences of stress in two ways: (a) perceptions of stressors via mindfully observing and monitoring internal reactions, and (b) coping with stressors with a nonjudgmental and nonreactive attitude (Roeser et al., 2013).

Based on established empirical evidence, Creswell and Lindsay (2014) proposed a biological model of mindfulness stress buffering account, in which mindfulness has been indicated to alter stress processing via two pathways, including a top-down regulatory pathway (i.e., recruiting central stress-regulatory regions of prefrontal cortex) and a bottom-up pathway (i.e., altering the peripheral stress-response cascades). Specifically, mindfulness buffers central stress processing regions in the brain (e.g., amygdala), which in turn reduces the peripheral physiological stress-response activation of sympathetic-adrenal-medullary (SAM) and hypothalamic-pituitary-adrenal (HPA) axes, and further leads to the decrease of subsequent risk for stress-related disease.

Stress and athlete burnout are two closely related constructs (e.g., Gustafsson et al., 2013; Raedeke & Smith, 2004). According to the cognitive-affective stress model of athlete burnout (Smith, 1986), burnout develops along with stress via four stages towards contextual, cognitive, physiological, and behavioral demands of stress. In short, burnout can be viewed as a particular and prolonged stress response to chronic stressors (Gustafsson et al., 2015). Therefore, high levels of mindfulness should be related to low levels of stress and athlete burnout. Empirical support for an inverse association between mindfulness and burnout was demonstrated in three
cross-sectional investigations of South African junior tennis athletes \( n = 104 \); Walker, 2013), Norwegian junior athletes \( n = 382 \); Moen, Federici, & Abrahamsen, 2015) and Swedish elite junior athletes \( n = 233 \); Gustafsson et al., 2015). Furthermore, in non-sport contexts, intervention studies have shown that enhanced mindfulness decreases in burnout among teachers (e.g., Roeser et al., 2015) and nurses (e.g., Mackenzie, Poulin, & Seidman-Carlson, 2006).

Previous research has explored possible mediational pathways from mindfulness to athlete burnout. For example, Gustafsson and colleagues (2015) demonstrated that the relationship between mindfulness and athlete burnout was partially mediated by both positive and negative affect, whereas positive affect fully mediated the link from mindfulness to the subscale of sport devaluation. The examination of the potential changing mechanisms can provide insights on explain how mindfulness is related to reduced experiences of athlete burnout. One potential mechanism by which mindfulness may lead to reduced levels of athlete burnout is through reductions in experiential avoidance. The construct of experiential avoidance is described as an unwillingness to experience unwanted private thoughts, feelings, and sensations, and attempts to change, alter, or avoid these private events (Hayes, Strosahl, & Wilson, 1999; Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). The tendency to experientially avoid, control or change negative personal experiences due to athlete burnout may result in progressively higher levels of distress and feelings of exhaustion, reduced sense of accomplishment and devaluation.

A systematic approach to reduce experiential avoidance is the acceptance and commitment therapy (ACT; Hayes et al., 1999). In ACT, mindfulness and acceptance processes are incorporated into commitment and behavior change processes that link to individuals’ values to overcome the ubiquitous and harmful experiential avoidance and cognitive defusion (Hayes,
According to the model of ACT, the mindfulness ability of bringing attention completely to the present moment is designed to counter experiential avoidance by adopting a direct and non-evaluative contact with present experiences (Hayes et al., 1999). Preliminary evidence showed that intervention studies that are based on ACT model can significantly reduce burnout in samples of substance abuse counselors (Hayes et al. 2004) and social workers (Brinkborg, Michanek, Hesser, & Berglund, 2011).

Athletes’ mindfulness capability might exert an influence on burnout via the decrease of experiential avoidance. Theoretically, the two facets (mindful observation and nonjudgmental/nonreactive attitude) of how mindfulness influences experiences of stress and athlete burnout are in line with the reductions of those two key components of experiential avoidance, namely, (a) the tendency to be unwilling to sustain contact with present moment experiences, and (b) the intention to change or control the experiences (Chawla & Ostafin, 2007).

Empirically, higher levels of mindfulness have been found to be significantly related to lower levels of experiential avoidance in a cross-sectional study of elite Chinese athletes (Zhang, Chung, Si, & Liu, 2014). In addition, a recent randomized controlled trial demonstrated that mindfulness training can lead to a significant decrease of experiential avoidance (i.e., increase of experiential acceptance) in a sample of beginners in dart throwing (Zhang et al., 2016).

Although the direct link from experiential avoidance to athlete burnout has not yet been established in sport contexts, high levels of experiential avoidance have been demonstrated to be significantly related to higher levels of burnout in a sample of Spanish critical care nurses (Iglesias, de Bengoa Vallejo, & Fuentes, 2010). Research has also shown that experiential avoidance is a stronger and more consistent determinant of burnout than work-related variables such as job control, coworker support and workload among a sample of addiction counselors.
Building on the theoretical explanation and established relations among mindfulness, experiential avoidance, and burnout, we aimed to test this theoretical sequence in a sample of athletes, and examine whether or not experiential avoidance mediates the inverse association between mindfulness and athlete burnout in the current study.

Currently, little work has been devoted to tests of gender differences of the associations among mindfulness, experiential avoidance and burnout. An understanding of the moderating effect of gender on the changing mechanism from mindfulness to athlete burnout through the reduction in experiential avoidance is important if practitioners are to effectively apply the mindfulness training on decreasing athlete burnout in intervention studies in the future. The test of measurement invariance of the latent constructs is a prerequisite to assessments of the associations among the latent factors, tests of the latent factor mean differences, and moderation analyses (Martin, Sass, & Schmitt, 2012). Previous research has indicated measurement invariance across gender on mindfulness assessed by the Mindful Attention Awareness Scale (Brown & Ryan, 2003) in a sample of elite athletes (Chung, Si, Liu, & Zhang, 2013). Likewise, gender invariance of experiential avoidance as measured by Acceptance and Action Questionnaire II (Bond et al., 2011) was demonstrated in sport contexts (Zhang et al., 2014). In contrast, there are mixed findings regarding gender differences of the different dimensions of burnout in sport context (Goodger, Gorely, Harwood, & Lavallee, 2007) and also in working context (Purvanova & Muros, 2010). However, previous research (Gustafsson et al., 2007) failed to establish the gender invariance of athlete burnout as measured by the Eades Burnout Inventory (Eades, 1990). Moreover, to date, there is no gender measurement invariance analysis on another widely-used measure of athlete burnout, the Athlete Burnout Questionnaire (Raedeke & Smith,
which makes it premature to directly test the gender differences on both the direct and indirect associations among the latent factors of interest.

In summary, the purposes of this study were to examine the associations among mindfulness, experiential avoidance and three dimensions of athlete burnout (i.e., physical/emotional exhaustion, reduced sense of accomplishment, and devaluation), and test a theoretical sequence in which mindfulness is related directly to burnout and indirectly through experiential avoidance a sample of adolescent athletes (see Figure 1). It was hypothesized that mindfulness would be inversely associated with experiential avoidance and the three dimensions of athlete burnout (i.e., higher levels of mindfulness are related to lower levels of experiential avoidance and athlete burnout), whereas the relation between experiential avoidance and the three dimensions of athlete burnout would be positive (i.e., higher levels of experiential avoidance are related to lower levels of athlete burnout). In addition, it was hypothesized that mindfulness would be indirectly associated with lower levels of burnout via experiential avoidance. Lastly, we investigated the measurement invariance of the Athlete Burnout Questionnaire (Raedeke & Smith, 2001) across gender as well as gender differences in the relations of the proposed theoretical sequence; given the absence of past work on these associations, no specific hypothesis were proposed.

Methods

Participants

In total, 387 adolescent athletes (164 females, 222 males, and 1 unknown; $M_{\text{age}} = 15.44$ years, $SD_{\text{age}} = 1.42$; range 12 - 18) participated in this study. All participants were recruited from five elite sport training centers in China, and drawn from 21 different sports, comprising a variety of individual (n = 332; e.g., archery, table tennis, and wrestling) and team (n = 55; e.g.,
basketball, soccer, and volleyball) disciplines. The majority of participants were competing at national levels (n = 356), with some athletes competing or had competed at the international level (n = 31). On average, athletes had participated in their sport competitively for 2.79 years (SD = 1.42; range .50 - 10).

Measures

**Mindful attention awareness scale** (MAAS; Brown & Ryan, 2003). The MAAS is a 15-item unidimensional scale measuring the general tendency of one’s attention to or awareness of present-moment experiences (e.g., “I find myself doing things without paying attention”). Items are rated on a 6-point Likert scale from 1 (almost always) to 6 (almost never). The Chinese version of the MAAS (Deng et al., 2012) has demonstrated satisfactory construct validity, internal consistency reliability (ρ = .86), and test-retest reliability (r = .66) in a sample of elite Chinese athletes (Chung et al., 2013).

**Acceptance and action questionnaire II** (AAQ-II; Bond et al., 2011). The AAQ-II is a 7-item self-report measure used to assess the tendency to avoid aversive internal experiences, including negative emotions, thoughts, and memories (e.g., “My painful memories prevent me from having a fulfilling life”). Items are rated on a 7-point Likert scale, from 1 (never true) to 7 (always true). The Chinese version of the AAQ-II has demonstrated satisfactory construct validity, internal consistency reliability (ρ = .85), and test-retest reliability (r = .74) in a sample of elite Chinese athletes (Zhang et al., 2014).

**Athlete burnout questionnaire** (ABQ; Raedeke & Smith, 2001). The ABQ is a 15-item self-report instrument measuring three components of burnout: emotional/physical exhaustion (e.g., “I am exhausted by the mental and physical demands of sport”), reduced sense of accomplishment (e.g., “I am not achieving much in sport”), and devaluation (e.g., “The effort I
spent in sport would be better spent doing other things"). Items are rated on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). The ABQ was translated and back-translated into Chinese for the purposes of this study. The Chinese version of the ABQ has not been tested in past work and therefore was examined with the current sample.

**Procedure**

Prior to data collection, ethical approval was granted from the University of [Name masked for review]. The coaches and team managers at five provincial level sport training centers located in east, east north, middle, north, south, and west south of Mainland China were contacted via sport psychologists based in these centers. The purpose of the study was explained to them in order to obtain gate keeper permission to distribute the survey package to athletes. The questionnaires were distributed by the researchers or the center-based sport psychologists to athletes prior to, or after, their regular training sessions, and the voluntary role and the confidential nature of their responses were explained; informed consent forms were collected from athletes. Athletes were asked to return the completed questionnaires at the next training session. Once the questionnaires had been collected, they were returned to the primary researcher for data input and analysis.

**Data Analysis**

The measurement model for each psychological instrument was firstly tested using confirmatory factor analysis (CFA) with the robust maximum likelihood (MLR) estimation within Mplus 7.3 (Muthén & Muthén, 1998-2012). A sequential model testing approach was adopted, via multi-group CFA, to examine whether the first-order three-factor measurement model of the athlete burnout displayed invariance across male and female athletes (Dimitrov, 2010). The configural invariance was firstly examined without imposing any equality constraints
on model parameters estimates across gender groups. Then, metric invariance was examined by constraining the factor loadings to be equal across gender groups. The third step was to examine the strong invariance by constraining both factor loadings and item intercepts across gender groups. Finally, strict invariance was examined by constraining the factor variances and covariances across gender groups to be equal, while retaining the constraints of factor loadings and item intercepts. In line with Cheung and Rensvold (2002) for determining invariance in multiple-sample testing, the absolute value of the change of CFI (ΔCFI) between two nested samples larger than .01 indicates a lack of invariance.

Structural equation modelling (SEM) was used to test the hypothesized theoretical sequence depicted in Figure 1. To obtain confidence intervals of effects from mindfulness to the three dimensions of athlete burnout, simple models excluding experiential avoidance were also tested. The 95% bias corrected (BC) bootstrapping method (with n = 5000 bootstrap resamples) was subsequently employed to test the indirect effects of mindfulness on athlete burnout through experiential avoidance (Hayes, 2009). An indirect effect is considered meaningful if no zero value is included within the upper and lower-bound confidence interval (CI) of the indirect effect path. The guidelines provided by Cohen (1988) were followed to interpret the effect size of the regression paths and correlation coefficients (small, $r = 0.1$; medium, $r = 0.3$; or large $r = 0.5$).

With regard to the CFA and SEM tests, acceptable model-data fit was supported when the values of comparative fit index (CFI) and Tucker-Lewis index (TLI) exceeded .90, and the value of root-mean-square error of approximation (RMSEA) was less than .08 (Marsh, Hau, & Grayson, 2005). Composite reliability (Rho [$\rho$]; Raykov, 1997) was calculated for each subscale to provide an index of internal reliability.
The procedure recommended by Lau and Cheung (2012) was followed to test gender differences regarding the strength of the indirect effects in the mediation models. The difference of an indirect effect is considered meaningful when the upper and lower-bound of the 95% BC bootstrap confidence interval does not encompass zero. Although the use of this method will slightly inflate Type I error rate, the extra power provided for comparing specific mediation effects may outweigh this drawback (Taylor, MacKinnon, & Tein, 2008). This method can also provide more information than the chi-square difference tests in which the equivalent constraints are imposed on the structural paths (Lau & Cheung, 2012).

**Results**

**Preliminary Analyses**

The data of two athletes were removed because they did not provide responses to the ABQ, thereby leaving a sample size of 385 valid responses. No evidence of non-normality was revealed (i.e., absolute values of skewness and kurtosis of all items were < 2) and there was no significant pattern of missing data in the remaining responses (missing data = 0.58%). However, the Missing Completely at Random (MCAR; Little, 1988) test revealed that data were not missing completely at random ($p = .001$). Therefore, the robust maximum likelihood estimator (MLR) was used. Missing data were handled using full information maximum likelihood (FIML) estimation, which produces more efficient and unbiased treatment of missing data than other methods such as pairwise deletion and imputation (Enders & Bandalos, 2001).

The means, standard deviations, internal reliability coefficients, and bivariate correlations for all study measures are detailed in Table 1. All subscales evidenced adequate internal reliability ($\rho > .70$), except the subscale of reduced sense of accomplishment ($\rho = .52$). Preliminary analyses indicated medium to high levels of significant and negative associations
from mindfulness to the three dimensions of athlete burnout and experiential avoidance, as well as medium to high levels of significant and positive associations from experiential avoidance to three dimensions of athlete burnout.

**Factorial Validity of the Measurement Instruments**

The CFA revealed that the hypothesized correlated three-factor model of athlete burnout was acceptable according to the multiple indices of model fit, $\chi^2 (87) = 135.33$, $p < .001$, CFI = .96, TLI = .95, RMSEA = .038 (90% CI = .025 to .050). In addition, the model fit of the hypothesized single-factor model of mindfulness was also acceptable, $\chi^2 (90) = 152.37$, $p < .001$, CFI = .93, TLI = .92, RMSEA = .042 (90% CI = .030 to .054). Finally, the CFA revealed that the hypothesized single-factor model of the experiential avoidance was acceptable according to the multiple indices of model fit, $\chi^2 (14) = 37.82$, $p < .001$, CFI = .95, TLI = .93, RMSEA = .066 (90% CI = .041 to .092). Given that measurement invariance of the single-factor model of mindfulness (Chung et al., 2013) and experiential avoidance (Zhang et al., 2014) across male and female athletes have been established, only the gender measurement invariance of three-factor model of athlete burnout was further examined in the current study. The absolute value of $\Delta$CFI (change of CFI) was less than .01 thereby providing support for gender invariance, including configural invariance, metric invariance, strong invariance, but not the strict invariance (i.e., invariant factor variance and covariance). Based on the demonstration of strong invariance across groups, moderation analysis (i.e., structural invariance) of structural parameters can be conducted (Wang & Wang, 2012). A summary of results is presented in Table 2.

**Structural Validity of the Hypothesized Theoretical Sequence**

The full measurement model with all variables included (i.e., mindfulness, experiential avoidance, emotional/physical exhaustion, reduced sense of accomplishment, and sport
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devaluation) was examined prior to the test of the paths and indirect effects in three independent
structural models, and an acceptable model fit was indicated, $\chi^2 (619) = 895.69, p < .001, CFI$
$= .91, TLI = .90, RMSEA = .034 (90% CI = .029 to .039). An overview of the model fit indices
and path coefficients for all three structural models tested is detailed in Table 3. Significant and
negative total effects from mindfulness to the three dimensions of athlete burnout were obtained
in the simple model (higher levels of mindfulness related to lower levels of athlete burnout),
which represent medium and large effect sizes. Similarly, in the mediation model, the direct
effects from mindfulness to the three dimensions of athlete burnout were negative and significant,
with the size of path coefficients interpreted as medium in strength. The direct effect from
mindfulness to devaluation was higher than from mindfulness to reduced sense of
accomplishment and emotional/physical exhaustion, indicating that mindfulness is related to
lower levels of devaluation than reduced sense of accomplishment and emotional/physical
exhaustion. The indirect effects from mindfulness to the three dimensions of athlete burnout via
experiential avoidance were negative and significant and similar in size (small to medium),
indicating that the higher level of mindfulness is related to lower levels of athlete burnout via
the mediating variable of experiential avoidance.

**Gender Differences in the Structural Model**

The 95% confidence interval for the indirect effects from mindfulness to reduced sense of
accomplishment (-.01 to .32), devaluation (-.15 to .25), and physical/emotional exhaustion (-.03
to .50) encompassed zero, thereby indicating that there were no gender difference in these
pathways. The 95% confidence interval analysis indicated that there were no gender differences
on direct effects from mindfulness to reduced sense of accomplishment (-.42 to .02) and
physical/emotional exhaustion (-.42 to .12). However, a significant gender difference on the
direct effect from mindfulness to devaluation was found (-.87 to -.08). Further examination of this direct effect indicated that there was a larger effect size for male athletes when compared with female athletes ($\beta = -.50$ vs. $\beta = -.07$).

**Discussion**

The primary purpose of this study was to test a theoretical sequence in which mindfulness is directly related to burnout and indirectly through experiential avoidance. To date, this theoretical sequence has not yet been investigated, and therefore can shed light on the potential mechanisms by which mindfulness might be related with athlete burnout. We also tested whether or not gender differences existed in these proposed direct and indirect (via experiential avoidance) pathways from mindfulness to athlete burnout. Consistent with our expectations, we revealed significant and negative effects from mindfulness to experiential avoidance and all three dimensions of athlete burnout. There were indirect effects of mindfulness on all three dimensions of athlete burnout via experiential avoidance. With the exception of the direct effect from mindfulness to the devaluation component of burnout, all direct and indirect pathways were not significantly different between male and female athletes.

The mindfulness ability of focusing attention and awareness on one’s negative thoughts and feelings instead of trying to dis-identify with them may help athletes prevent the occurrence of emotional/physical exhaustion and the subsequent feelings of reduced sense of accomplishment and devaluation (Gustafsson et al., 2015; Jouper & Gustafsson, 2013). The significant and inverse associations between mindfulness and all three dimensions of athlete burnout revealed in the current study are in line with previous studies in junior elite athletes (Gustafsson et al., 2015; Moen et al., 2015; Walker, 2013), providing additional support for the link between mindfulness and athlete burnout. However, it should be noted that the inverse
association from mindfulness to devaluation was stronger than the pathways from mindfulness to reduced sense of accomplishment and emotional/physical exhaustion in the simple model, which were similar in magnitude. The direct association from mindfulness to devaluation remained significant in the mediation model, whereas the associations from mindfulness to reduced sense of accomplishment and emotional/physical exhaustion became small and non-significant. These findings suggest that the mindfulness ability of living in the present moment in a receptive and non-judgmental manner may be able to more directly and largely counter the tendency of devaluing one’s sport experiences (Kabt-Zinn, 1990). In other words, the tendency to evaluate their sport experiences in a negative way is reduced when athletes were equipped with the capacity to notice and let go of such self-evaluative thoughts. Collectively, these findings suggest that mindfulness may be important for reducing or minimizing athlete burnout syndromes during training and competition, and therefore may represent a protective factor.

The current findings add to a growing body of research within sport settings (e.g., Zhang et al., 2014) and other achievement and clinical contexts (e.g., Glick, Millstein, & Orsillo, 2014; Hayes et al., 2004) that have supported an inverse association between mindfulness and experiential avoidance. Collectively, these findings suggest that the protective nature of mindfulness allows individuals to be more accepting of potentially distressing experiences, which in turn help alleviate their tendencies to experientially avoid these negative private experiences (Gardner & Moore, 2007; Hayes et al., 1996). Most importantly, the large effect size from mindfulness to experiential avoidance may indicate that experiential avoidance works as a proximal mediator from mindfulness to diverse psychological problems (Fletcher & Hayes, 2005). The positive relation from experiential avoidance to burnout confirmed in the current study and other contexts (e.g., Iglesias et al., 2010) provides further empirical support to the
theoretical framework of acceptance and commitment therapy (Hayes et al., 1999), in which experiential avoidance is viewed as an important risk factor that relates to a diverse array of psychological and behavioral difficulties (Biglan, Hayes, & Pistorello, 2008).

Mindfulness and acceptance-based behavioral change theory led us to expect that experiential avoidance might help explain the influence from mindfulness to three dimensions of athlete burnout (Gardner & Moore, 2012; Hayes, Strosahl, & Wilson, 2011). Athletes with high levels of mindfulness tend to have low levels of experiential avoidance (Gardner & Moore, 2007; Hayes et al., 1996), which may in turn minimize the maladaptive influences of stressors and other negative factors on the syndromes of athlete burnout. The demonstration of experiential avoidance as a mediator between mindfulness and athlete burnout in the current study provides further support for the proposition that experiential avoidance is a mechanism of change in mindfulness- and acceptance-based interventions aiming to prevent and recover from the symptoms of athlete burnout (Gardner & Moore, 2007; Jouper & Gustafsson, 2013). It is important that future research confirms the mediational properties of experiential avoidance in mindfulness- and acceptance- based interventions adopting a randomized control trial design. In short, the current findings contribute to the theoretical development of the mechanism explaining how mindfulness can help alleviate the burnout syndromes.

With the exception of the direct effect from mindfulness to devaluation, analyses revealed that the associations among mindfulness, experiential avoidance, and burnout were not statistically different between male and female athletes. The indirect effects from mindfulness to all three dimensions of athlete burnout via experiential avoidance were generally larger for female athletes when compared with male athletes. In particular, we found larger indirect effects from mindfulness to reduced sense of accomplishment and physical/emotional exhaustion for
female than male athletes in the current study. This finding may be the case since females report higher level of experiential avoidance, reduced sense of accomplishment, and physical/emotional exhaustion than males (Biglan et al., 2015; Howe-Martin et al., 2012; Purvanova & Muros, 2010). Although the use of 95% BC bootstrap confidence interval to compare the gender difference of the indirect effects is considered to have much power and provides more information than the significance test (Lau & Cheung, 2012), further examinations of gender difference on the mediation effects using a larger and more diverse athletic population is needed in order to (dis)confirm the current findings (Fritz & MacKinnon, 2007).

Although it was not the main focus of the current study, the mean scores of athlete burnout in our sample were high for reduced sense of accomplishment, emotional/physical exhaustion, and devaluation (M = 2.80, 2.88, and 2.50, respectively), when compared to the scores of western athletes, such as New Zealand elite junior rugby players (M = 2.35, 2.76, and 2.00, respectively; Hodge, Lonsdale, & Ng, 2008) and Swedish elite junior athletes (M = 2.49, 1.87, and 1.70, respectively; Gustafsson et al., 2015). Given that elite Chinese athletes normally start their professional training in a closed environment earlier (Si, Duan, Li, & Jiang, 2011) and train longer and harder when compared to their western counterparts (Hays, 2008), as well as report higher levels of negative dimensions of mood (Zhang, Si, Chung, Du, & Terry, 2014), it may be that the norm/cut-off scores of both high and low burnout for elite Chinese athletes could be higher than their western counterparts (Hodge et al., 2008). It might also be that the Chinese translation of the Athlete Burnout Questionnaire did not accurately reflect the original meaning as expected by the questionnaire developers (Sumathipala & Murray, 2000). Additional research on the translation of this scale or the cultural dimensions of burnout in Chinese athletes might shed light on the cultural difference on the interpretation of the burnout items.
Notwithstanding the promising findings in the current study, limitations should also be considered and future direction could be informed when drawing from conclusions from this work. Firstly, inferences regarding the hypothesized causal sequence must be tempered by the cross-sectional nature of this study. Future research using longitudinal models and experimental designs would permit conclusions regarding the hypothesized theoretical sequences tested in this study. In order to establish conclusions regarding causal effects, it is important that future research makes use of randomized controlled trials (Cartwright, 2010). Secondly, the findings may be tempered by common method bias since we relied on self-report measures. Future studies might use multiple evaluation method or objective measures to alleviate this concern. For example, it would be informative to collect behavioral measures of experiential avoidance and biomarkers of athlete burnout in the future. Thirdly, the internal consistency of the reduced sense of accomplishment was comparatively lower than the other two subscales. The norm to accept the internal consistency value is .70, and therefore the low internal consistency value (.52) of the reduced sense of accomplishment subscale should be interpreted cautiously. Given the fact that the number of items in this dimension is small (< 10), high level of internal consistency reliability is less likely with a small number of items (Loewenthal, 2001). We therefore can consider this low value as acceptable since previous studies have provided sound theoretical and practical reasons for all items to be included in this dimension (e.g., Raedeke & Smith, 2001). Nonetheless, future studies should further examine reduced sense of accomplishment subscale due to the limitations of less reliable scales in measurement and structural model tests.

In conclusion, the current study extends our understanding of the inversed association from mindfulness to athlete burnout by revealing that their relation is mediated by experiential avoidance. It was also demonstrated that there was no gender difference on the mediation effects.
of experiential avoidance on the inversed associations from mindfulness to the three dimensions of athlete burnout, although the overall size of the mediation effects were larger for female athletes than male athletes. The findings provide a platform from which future research can replicate and extend our understanding of the inversed association from mindfulness to athlete burnout, and explanations for the nature of this relation.
References


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Figure 1. The mediation model of mindfulness on athlete burnout through experiential avoidance.

Path c represents the inversed total effects from mindfulness to the three dimensions of athlete burnout estimated in a simple model without including experiential avoidance; path c’ represents the inversed direct association from mindfulness to the three dimensions of athlete burnout in the mediation model; path a represents the inversed direct association from mindfulness to experiential avoidance; and path b represents the positive direct association from experiential avoidance to athlete burnout. The product of a and b (a×b) resent the inversed indirect effects from mindfulness to athlete burnout via experiential avoidance.
Table 1.

*Descriptive statistics and Pearson correlation matrix for mindfulness, experiential avoidance, and three dimensions of athlete burnout*

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>Composite Reliability</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>1. Mindfulness</td>
<td>4.10</td>
<td>.76</td>
<td>.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Experiential avoidance</td>
<td>3.30</td>
<td>1.06</td>
<td>.81</td>
<td>-.47</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Reduced sense of accomplishment</td>
<td>2.80</td>
<td>.77</td>
<td>.52</td>
<td>-.26</td>
<td>.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Emotional/Physical exhaustion</td>
<td>2.88</td>
<td>.75</td>
<td>.76</td>
<td>-.24</td>
<td>.36</td>
<td>.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Devaluation</td>
<td>2.50</td>
<td>.78</td>
<td>.77</td>
<td>-.40</td>
<td>.39</td>
<td>.53</td>
<td>.63</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* All correlations were significant at $p < .001$ (2-tailed).
## Measurement Invariance of the Three-factor Model of Athlete Burnout across Male and Female Athletes

<table>
<thead>
<tr>
<th>Model</th>
<th>$\chi^2_R$</th>
<th>df</th>
<th>$\chi^2_R/df$</th>
<th>CFI</th>
<th>ΔCFI</th>
<th>RMSEA</th>
<th>RMSEA 90% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1: Configural invariance</td>
<td>285.40</td>
<td>184</td>
<td>1.55</td>
<td>.918</td>
<td>.054</td>
<td>.041</td>
<td>.041-.065</td>
</tr>
<tr>
<td>M2: Metric invariance</td>
<td>293.71</td>
<td>196</td>
<td>1.50</td>
<td>.921</td>
<td>.003</td>
<td>.051</td>
<td>.038-.063</td>
</tr>
<tr>
<td>M3: Strong invariance</td>
<td>307.43</td>
<td>201</td>
<td>1.53</td>
<td>.914</td>
<td>-.007</td>
<td>.053</td>
<td>.040-.064</td>
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<tr>
<td>M4: Strict invariance</td>
<td>326.87</td>
<td>207</td>
<td>1.58</td>
<td>.903</td>
<td>-.011</td>
<td>.055</td>
<td>.043-.066</td>
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</tbody>
</table>

*Note. $\chi^2_R$ = Robust chi-square; df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.*
Table 3.
Fit statistics and estimated path coefficients for structural models

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Model fit</th>
<th>Mindfulness</th>
<th>Mindfulness</th>
<th>EA</th>
<th>EA</th>
<th>Indirect effects</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>χ²</td>
<td>df</td>
<td>CFI</td>
<td>TLI</td>
<td>RMSEA(90%CI)</td>
<td>Burnout</td>
</tr>
<tr>
<td>Reduced sense of accomplishment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>β</td>
</tr>
<tr>
<td>Simple model</td>
<td>349.01</td>
<td>169</td>
<td>.88</td>
<td>.86</td>
<td>.053(.045 to .060)</td>
<td>c = -.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-.47 to -.06)</td>
</tr>
<tr>
<td>Mediation model</td>
<td>601.62</td>
<td>321</td>
<td>.88</td>
<td>.87</td>
<td>.048(.042 to .053)</td>
<td>c’ = -.05</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-.22 to .01)</td>
</tr>
<tr>
<td>Emotional/Physical exhaustion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>β</td>
</tr>
<tr>
<td>Simple model</td>
<td>350.27</td>
<td>169</td>
<td>.90</td>
<td>.88</td>
<td>.053(.045 to .061)</td>
<td>c = -.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-.37 to -.13)</td>
</tr>
<tr>
<td>Mediation model</td>
<td>583.29</td>
<td>321</td>
<td>.90</td>
<td>.89</td>
<td>.046(.040 to .052)</td>
<td>c’ = -.05</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-.17 to .07)</td>
</tr>
<tr>
<td>Devaluation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>β</td>
</tr>
<tr>
<td>Simple model</td>
<td>284.68</td>
<td>169</td>
<td>.93</td>
<td>.92</td>
<td>.042(.034 to .051)</td>
<td>c = -.49</td>
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<td></td>
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<td>(-.72 to -.33)</td>
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<tr>
<td>Mediation model</td>
<td>529.14</td>
<td>321</td>
<td>.92</td>
<td>.91</td>
<td>.041(.035 to .047)</td>
<td>c’ = -.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-.56 to -.16)</td>
</tr>
</tbody>
</table>

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; EA = Experiential avoidance; c = the total effect from mindfulness to burnout in the simple model; c’ = the direct effect from mindfulness to burnout in the mediation model. In the simple model, the proposed mediator experiential avoidance isn’t included. Underlined path coefficients were not significant at p = .05. All other path coefficients were significant at p < .01. Bootstrap resamples: n = 5000.