



The Effects of Mindfulness on Athlete Burnout, Subjective Well-being, and Flourishing Among Elite Athletes: A Test of Multiple Mediators

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Abstract

Objectives The current study aimed to examine the mediation effects of experiential acceptance, cognitive defusion, decentering, and nonattachment on the paths from mindfulness to athlete burnout, subjective well-being, and flourishing among elite athletes.

Methods Chinese elite athletes ($n = 515$; 225 females) were recruited from three provincial sports centers representing 22 sports. The athletes completed self-reported measures of mindfulness, experiential acceptance, cognitive defusion, decentering, and nonattachment, athlete burnout, subjective well-being, and flourishing. Path analyses were conducted to test the mediation effects from mindfulness to athlete burnout, subjective well-being, and flourishing.

Results Path analyses revealed that the effect from mindfulness to athlete burnout was mediated by experiential acceptance, cognitive defusion, and nonattachment, but not decentering. The effect from mindfulness to subjective well-being was mediated by decentering, cognitive defusion, and nonattachment, but not experiential acceptance. The effect from mindfulness to flourishing was mediated by decentering and nonattachment, but not experiential acceptance and cognitive defusion.

Conclusion Findings from this study provided empirical support for the changing mechanisms regarding how mindfulness leads to adaptive and maladaptive outcomes, which can inform future mindfulness-based interventions for elite athletes.

Keywords Cognitive defusion · Decentering · Experiential acceptance · Nonattachment · Sport

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In the past 20 years, there has been a growing interest in studying mindfulness in sporting contexts (Gardner & Moore, 2020). For athletes, mindfulness can be viewed as a dispositional construct that they are able to regulate their attention on the present performance, be aware of the internal and external private experiences, and adopt an accepting and non-judgmental attitude (Thienot et al., 2014; Zhang et al., 2017). Preliminary evidence has been established on the effects of mindfulness on adaptive and maladaptive outcomes among athletes, such as athlete burnout (Li et al., 2019), mental health (Shannon et al., 2020), subjective well-being (Chang et al., 2018), and flow (Cathcart et al., 2014). On the other hand, mindfulness practice within mindfulness-based interventions has been used to help athletes improve mindfulness abilities, enhance sport performance, and promote adaptive outcomes (Bühlmayer et al., 2017; Zhang & Su, 2020). To better understand how and why mindfulness-based interventions work, it is important to examine the mechanisms underpinning the effects of mindfulness on performance and adaptive and maladaptive outcomes

(Grabovac et al., 2011; Shapiro et al., 2006). Previously, researchers proposed impact mechanisms from mindfulness to sport performance with nine potential mediators, such as experiential acceptance, nonattachment, values clarification, and less rumination (Birrer et al., 2012).

Experiential acceptance as a core component of the acceptance and commitment therapy refers to fully accept the private experiences as what they are without avoidance or defense (Block-Lerner et al., 2009). According to the monitor and acceptance theory, experiential acceptance is a critical emotion regulation mechanism of mindfulness intervention that mindfulness might impact on the adaptive and maladaptive outcomes via experiential acceptance (Lindsay & Creswell, 2017). Preliminary evidence on the mediating effect of experiential acceptance on the path of mindfulness on athlete burnout has been established. For example, experiential avoidance (i.e., the opposite of experiential acceptance) was noted mediating the negative effects of mindfulness on athlete burnout in a sample of junior elite athletes (Zhang et al., 2016b). Experiential acceptance might also mediate the effect of mindfulness on athletes' subjective well-being as both mindfulness and experiential acceptance were significantly and positively related to subjective well-being of athletes (Zhang et al., 2014, 2017).

The effects of mindfulness on adaptive and maladaptive outcomes might also be mediated by nonattachment, which is defined as a flexible, balanced way of relating to one's experiences without clinging to or suppressing them (Sahdra et al., 2010). Given that individuals have habitual reactions of attachment and aversion reaction to the transient feelings and their concomitant mental proliferation led to suffering, the reduction of suffering by reducing the attached habitual reactions can be realized with high levels of mindfulness via nonattachment ability (Grabovac et al., 2011). The mediating role of nonattachment on the effects from mindfulness to both negative mental health (e.g., psychological distress, depression, and anxiety) and positive mental health (e.g., flourishing, subjective well-being, and satisfaction with life) has been preliminarily established in general population (Coffey et al., 2010; Whitehead et al., 2019). Nonattachment has been proposed as a key mediator on the effects from mindfulness to sport performance and adaptive and maladaptive outcomes (Birrer et al., 2012; Si et al., 2016), yet empirical evidence on the mediating role of nonattachment in sporting contexts is still lacking.

Previous studies demonstrated that mindfulness and decentering had significant and positive effects on flow, subjective well-being, and positive affect, as well as the significant and negative effects on negative affect and athlete burnout (e.g., Zhang et al., 2017). Decentering could explain the shift in perspective of how athletes are able to observe thoughts and feelings from a detached view (Zhang et al., 2016a). Likewise, reperceiving, a construct that is akin to

decentering, was proposed as the mechanism of how mindfulness affects behavioral change (Shapiro et al., 2006). According to the mindfulness-acceptance-commitment approach, mindfulness can be used to promote athletes' ability to decenter from connections among thoughts, feelings, and behavioral choices that has been automatically formed from previous experiences (Gardner & Moore, 2004). It therefore seems that decentering serves as a key mediator on the effects from mindfulness to adaptive (e.g., subjective well-being and flourishing) and maladaptive (e.g., athlete burnout) outcomes in sporting contexts.

Cognitive defusion is a construct conceptually similar to decentering, which is described as the ability to distance from thoughts and literally experience thoughts as mental events that do not necessarily need to be acted on (Hayes-Skelton et al., 2015). Grounded on the acceptance and commitment therapy, cognitive defusion is viewed as one of the key working mechanisms on the effects from mindfulness to adaptive and maladaptive outcomes (Fletcher & Hayes, 2005; Hayes et al., 2011). The process is that individuals alter their relationships to thoughts rather than attempting to change the contents of thoughts (Hayes et al., 2006). When individuals are in the state of mindfulness, cognitive defusion is related to the context that the verbal transformation of experiences is temporarily suspended (Blackledge, 2007). This is important for athletes to realize that facts are not their thoughts and beliefs. Empirical evidence is needed to demonstrate that cognitive defusion mediates on the effects from mindfulness to adaptive and maladaptive outcomes.

Flourishing refers to living within optimal human functioning, performance, generativity, and growth (Fredrickson & Losada, 2005; Keyes, 2002). In sporting contexts, flourishing refers to athletes' optimal psychological functioning and development of their true and highest potential (Ferguson et al., 2014). Currently, it remains less explored with only a few studies exploring athletes' experiences of flourishing in sports (Ferguson et al., 2019; Stander et al., 2017). Mindfulness could lead to higher athletic flourishing, which further contributes to better sports performance (Ashfield et al., 2012). Mindfulness assures individuals observe and are aware of their thoughts, feelings, and sensations in an acceptance attitude, which in the long-term can help individuals experience their personal events fully and promote flourishing (Keng et al., 2011). Preliminary evidence showed that nonattachment mediated the path from mindfulness to flourishing (Coffey et al., 2010). It is important to further examine the mediating roles from mindfulness to flourishing in order to develop effective interventions to promote flourishing among athletes.

The current study aimed to examine the mediating roles of experiential acceptance, cognitive defusion, decentering, and nonattachment on the effects of mindfulness to athlete burnout, subjective well-being, and flourishing among

elite athletes. Elite athletes refer to athletes who compete as Olympians, professional athletes, and collegiate athletes who train and compete like professional athletes (Reardon et al., 2019). In the current study, we focused on professional athletes. We hypothesized that the mediation effects of experiential acceptance, cognitive defusion, decentering, and nonattachment on the paths from mindfulness to athlete burnout are negative and significant. We also hypothesized that the mediation effects of the four mediators from mindfulness to subjective well-being are positive and significant. Moreover, we hypothesized that the mediation effects of the four mediators on the paths from mindfulness to flourishing are positive and significant.

Methods

Participants

Participants were elite Chinese athletes recruited from three provincial sports centers located in the North, Central, and South China. In total, there were 515 elite athletes (290 males and 225 females) aged from 12 to 31 years old ($M = 18.24$; $SD = 3.16$). Athletes represented 22 sports, including archery, athletics, badminton, basketball, boxing, diving, fencing, free combat, gymnastics, karate, korfbal, martial arts, modern pentathlon, shooting, swimming, synchronized swimming, table tennis, trampolining, volleyball, water polo, weightlifting, and wrestling. The years of training as elite athletes ranged from 1 to 22 years ($M = 7.42$ years; $SD = 3.85$). During the time of the investigation, athletes reported an average of 1.5 to 10 h of training per day ($M = 5.55$ h; $SD = 1.45$), and 2 to 7 days per week ($M = 5.90$ days; $SD = 0.49$). For competition experience, 493 athletes had national level experience and 132 athletes had international level experience. In addition, 202 athletes reported having previous mindfulness and meditation experience, while 308 athletes reported that they did not have mindfulness and meditation experience. Five participants did not report their competition experience and previous mindfulness and mediation experience.

Procedure

Prior to the start of the project, we obtained ethical approval to conduct the study from the Research Ethics Committee (REC) of Hong Kong Baptist University. We firstly contacted people-in-charge of the three elite sports training centers to get permissions of contacting the center-based elite athletes. Our research team members, center-based physicians, physiotherapists, sport psychology practitioners, and team managers distributed the package of questionnaires to elite athletes in person. Athletes completed the self-reported

questionnaires under supervision, with informed consent forms collected from athletes at the same time. For athletes younger than 18 years old, we also obtained approval from their coaches who served as a proxy of parents.

Measures

Mindfulness We used the 16-item Chinese version Athlete Mindfulness Questionnaire (AMQ; Zhang et al., 2017) to measure athletes' mindfulness. The AMQ consists of three factors: (a) present-moment attention (e.g., "I can easily sustain my attention on the competition"), (b) awareness (e.g., "I am aware that my emotions during training and competition can influence my thinking and behavior"), and (c) acceptance (e.g., "Even though some thoughts and feelings during training and competition may be unpleasant or miserable, I can get along with them peacefully"). Items were rated on a five-point Likert-type scale, ranging from never true (1) to always true (5). In the current study, we used the total score to measure mindfulness and the internal consistency reliability of AMQ is $\alpha = 0.82$.

Decentering We used the 12-item Chinese version Decentering Scale for Sport (DSS; Zhang et al., 2016a) to measure athletes' decentering. The DSS is a unidimensional scale measuring an athlete's ability to observe his or her thoughts and feelings from a detached view (e.g., "I can distinguish thoughts which are objective reflections from those which are my personal thinking"). Items were rated on a five-point Likert-type scale, ranging from never true (1) to always true (5). The internal consistency reliability of DSS in the current study is $\alpha = 0.81$.

Experiential Acceptance We measured athletes' experiential acceptance by using the reversed score of the 7-item Chinese version Acceptance and action questionnaire II (AAQ-II; Bond et al., 2011). Items (e.g., "I'm afraid of my feelings") were on a seven-point Likert-type scale, ranging from 1 (never true) to 7 (always true). The AAQ-II was developed to assess a person's experiential avoidance and experiential acceptance, in which high scores on the AAQ-II are reflective of greater experiential avoidance, while low scores reflect greater experiential acceptance (Bond et al., 2011). The Chinese version AAQ-II demonstrated satisfactory reliability and validity in Chinese athletes (Zhang et al., 2014). The internal consistency reliability of the AAQ-II in the current study is $\alpha = 0.88$.

Cognitive Defusion We measured athletes' cognitive defusion by using the reversed score of the 7-item Chinese version Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014). Items (e.g., "I struggle with my thoughts") were rated on a seven-point Likert-type scale, ranging from 1 (never

true) to 7 (always true). CFQ measures a unidimensional construct representing a continuum from cognitive fusion (i.e., higher scores of CFQ) to cognitive defusion (i.e., lower scores of CFQ) (Gillanders et al., 2014). The Chinese version CFQ has been validated in a previous study with satisfactory reliability and validity (Zhang et al., 2016a). The internal consistency reliability of the CFQ in the current study is $\alpha=0.90$.

Nonattachment We used the 8-item Chinese version Nonattachment Scale–Short Form (NAS-SF; Chio et al., 2018) to measure athletes' nonattachment. The NAS-SF was developed from the 30-item Nonattachment Scale (NAS; Sahdra et al., 2010). Items (e.g., “I can let go of regrets and feelings of dissatisfaction about the past”) were rated on a six-point Likert-type scale, ranging from 1 (disagree strongly) to 6 (agree strongly). The internal consistency reliability of the Chinese version NAS-SF in the current study is $\alpha=0.83$.

Athlete Burnout The Chinese version Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001; Zhang et al., 2016b) was used. The 15-item ABQ has three subscales, including reduced sense of accomplishment, emotional/physical exhaustion, and sport devaluation. Previous studies indicated that the subscales of reduced sense of accomplishment and sport devaluation are unstable, lack of clear relationships among the three subscales, and theoretically overlapped with other constructs (Gustafsson et al., 2011; Lundkvist et al., 2018). Therefore, it was recommended that the exhaustion subscale as the core component should be used to represent athlete burnout (Gustafsson et al., 2016). In the current study, we used the emotional/physical exhaustion subscale (e.g., “I feel extremely tired from sport participation”) to represent athlete burnout. Items were rated on a five-point Likert-type scale, ranging from 1 (almost never) to 5 (almost always). The internal consistency of athlete burnout using the emotional/physical exhaustion subscale is $\alpha=0.82$.

Subjective Well-being We measured athletes' subjective well-being using the 6-item Chinese version training and competition well-being scale (TCWS; Zhang & Liang, 2002). The TCWS is a scale specifically developed to assess the subjective well-being of Chinese athletes. Items (e.g., “In many aspects, my training and competition situation are close to ideal”) were rated on seven-point Likert-type scale, ranging from 1 (strongly disagree) to 7 (strongly agree). The internal consistency reliability of TCWS in the current study is $\alpha=0.75$.

Flourishing Given the fact that there is a lack of consistent definition on flourishing in sport and no well-developed scales for measuring sport-specific flourishing (Ferguson

et al., 2019; Stander et al., 2017), we used a self-designed three-item scale for measuring flourishing in elite Chinese athletes (see Appendix 2 and Appendix 3 at the online supplementary materials for the scale and its factorial validity indices). Specifically, we measured athletes' flourishing from three aspects: (a) overall athletic abilities and status at the current stage; (b) interpersonal maturity (i.e., with coaches, teammates, team managers and other people); and (c) introspective maturity (i.e., goal pursuit, coping with adversity, commitment, emotion regulation). Athletes were asked to rate the three aspects using a 11-point Likert-type scale, ranging from 0 (extremely bad) to 10 (extremely good) for item (a), and ranging from 0 (extremely immature) to 10 (extremely mature) for items (b) and (c). In the current study, the internal consistency reliability of the three-item flourishing scale was $\alpha=0.66$, which is slightly below the satisfactory level of $\alpha=0.70$. This can be viewed as marginally acceptable as the internal consistency reliability of 0.60 to 0.70 might still be useful for research measures (Aiken, 2000).

Data Analyses

Descriptive statistics and internal consistency reliabilities of the scales were calculated using IBM SPSS Statistics 25 (Armonk, NY; IBM Corp, 2017). We conducted path analysis using the Mplus 7.3 statistical software (Muthén & Muthén, 1998–2012) with a maximum likelihood (ML) estimation method. We tested the three dependent variables of athlete burnout, subjective well-being, and flourishing within the three mediation models (see Appendix 1 of the online supplementary materials for the mediation models presented at Figs. 1, 2, 3). Mindfulness was the predicting variable, while decentering, experiential acceptance, cognitive defusion, and nonattachment were the mediators. Gender, age, sports type (i.e., individual versus team sports), years of training, hours of training per day, and meditation related experience were controlled in those three mediation models.

We used multiple criteria to assess goodness of fit of the proposed models, including the comparative fit index (CFI), the root-mean-square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Values exceeding 0.90 for the CFI and less than 0.06 and 0.08 for the RMSEA and SRMR (Hu & Bentler, 1999), respectively, indicate good fit. The mediation effects were confirmed when an indirect effect of mindfulness on an outcome variable (e.g., subjective well-being) via a mediator (e.g., decentering) was statistically significant ($p < 0.05$) and zero was not included in the 95% confidence interval (CI) of its effect size.

Results

Preliminary Analyses

We described the means, standard deviations, internal consistency reliabilities, and the bivariate correlations among all study variables in Table 1. Preliminary analyses indicated medium to high levels of significant and positive correlations among mindfulness, the four mediators (i.e., decentering, experiential acceptance, cognitive defusion, and nonattachment), subjective well-being, and flourishing, and significant and negative correlation between mindfulness and athlete burnout. The mediators are significantly and positively correlated with subjective well-being and flourishing, and significantly and negatively correlated with athlete burnout with medium to large effect sizes.

Athlete Burnout

The mediation model of mindfulness on athlete burnout exhibited adequate fit with the data, $\chi^2(1) = 0.17, p = 0.677, CFI = 1.00, SRMR = 0.001, RMSEA(90\%CI) = 0.000(0.000, 0.088)$. Direct and indirect effects of the mediation model of mindfulness on athlete burnout are detailed in Table 2. The direct effects from mindfulness to decentering, experiential acceptance, cognitive defusion, and nonattachment were significant and positive. In addition, the direct effects from experiential acceptance, cognitive defusion, and nonattachment to athlete burnout were significant and negative. However, the direct effect from decentering to athlete burnout was non-significant. The mediation effects from mindfulness to athlete burnout via experiential acceptance, cognitive defusion, and nonattachment were significant and negative. However, mediation effect from mindfulness to athlete burnout via decentering was non-significant.

Table 1 Means, standard deviations (SDs), international consistency reliabilities, and correlations among the study variables

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Mindfulness	3.63	.47	.82							
2. Decentering	3.27	.55	.60**	.81						
3. Experiential acceptance	5.00	1.19	.23**	.28**	.88					
4. Cognitive defusion	4.79	1.21	.21**	.28**	.77**	.90				
5. Nonattachment	4.17	.93	.43**	.40**	.41**	.40**	.83			
6. Athlete burnout	2.55	.77	-.23**	-.26**	-.50**	-.48**	-.39**	.82		
7. Subjective well-being	4.33	1.07	.36**	.34**	.38**	.39**	.48**	-.45**	.75	
8. Flourishing	6.58	1.26	.33**	.32**	.35**	.34**	.35**	-.42**	.48**	.66

** $p < .001$; international consistency reliabilities using Cronbach's alpha coefficients for the variables at presented the diagonal

Table 2 Effects from mindfulness to athlete burnout via the mediators of decentering, experiential acceptance, cognitive defusion, and nonattachment among elite Chinese athletes ($n = 515$)

Effects	ES	95% CI		p
		LL	UL	
Direct effects				
Mindfulness → decentering	.601	.545	.657	<.001
Mindfulness → experiential acceptance	.236	.153	.319	<.001
Mindfulness → cognitive defusion	.213	.129	.296	<.001
Mindfulness → nonattachment	.419	.347	.492	<.001
Decentering → athlete burnout	-.077	-.155	.001	.054
Experiential acceptance → athlete burnout	-.244	-.356	-.132	<.001
Cognitive defusion → athlete burnout	-.195	-.308	-.082	.001
Nonattachment → athlete burnout	-.162	-.245	-.080	<.001
Indirect effects				
Mindfulness → decentering → athlete burnout	-.046	-.094	.001	.056
Mindfulness → experiential acceptance → athlete burnout	-.058	-.091	-.024	.001
Mindfulness → cognitive defusion → athlete burnout	-.041	-.071	-.012	.005
Mindfulness → nonattachment → athlete burnout	-.068	-.105	-.031	<.001

ES effect size, CI confidence interval, LL lower limit, UL upper limit

Subjective Well-Being

The mediation model of mindfulness on subjective well-being exhibited adequate fit with the data, $\chi^2(1) = 11.88$, $p < 0.001$, CFI = 0.990, SRMR = 0.010, RMSEA (90%CI) = 0.146 (0.080, 0.226). Direct and indirect effects of the mediation model of mindfulness on subjective well-being are detailed in Table 3. The direct effects from mindfulness to decentering, experiential acceptance, cognitive defusion, and nonattachment were the same as reported in the mediation model on athlete burnout. The direct effects from decentering, cognitive defusion, and nonattachment to subjective well-being were positive and significant. However, the direct effect from experiential acceptance to subjective well-being was non-significant. The mediation effects from mindfulness to subjective well-being via decentering, cognitive defusion, and nonattachment were significant and positive. However, the mediation effect from mindfulness to subjective well-being via experiential acceptance was non-significant.

Flourishing

The mediation model of mindfulness on flourishing exhibited adequate fit with the data, $\chi^2(1) = 9.50$, $p = 0.002$, CFI = 0.992, SRMR = 0.010, RMSEA (90%CI) = 0.130 (0.064, 0.210). Direct and indirect effects of the mediation model of mindfulness on flourishing are detailed in Table 4. The direct effects from mindfulness to decentering, experiential acceptance, cognitive defusion, and nonattachment were the same as reported in both mediation models from mindfulness to athlete burnout and subjective well-being. The direct effects from decentering, experiential acceptance,

and nonattachment to flourishing were significant and positive, but the direct effect from cognitive defusion to flourishing was non-significant. For the mediation effects, decentering and nonattachment significantly mediated the positive effects from mindfulness to flourishing. However, the mediation effects from mindfulness to flourishing via experiential acceptance and cognitive defusion were non-significant.

Discussion

In the current study, we examined the mediating effects of experiential acceptance, cognitive defusion, decentering, and nonattachment on the effects from mindfulness to athlete burnout, subjective well-being, and flourishing in a sample of Chinese elite athletes. We found significant and negative mediation effects from mindfulness to athlete burnout via experiential acceptance, cognitive defusion, and nonattachment, except decentering. In addition, decentering, cognitive defusion, and nonattachment significantly and positively mediated the effects from mindfulness to subjective well-being, except experiential acceptance. Decentering and nonattachment significantly mediated the effects from mindfulness to flourishing, although the mediating effects of experiential acceptance and cognitive defusion on the mindfulness-flourishing path were non-significant. Findings of this study provided preliminary empirical support on experiential acceptance, cognitive defusion, decentering, and nonattachment as potential changing mechanisms from mindfulness to athlete burnout, subjective well-being, and flourishing.

Experiential acceptance mediated the effects from mindfulness to athlete burnout. The significant mediation

Table 3 Effects from mindfulness to subjective well-being via the mediators of decentering, experiential acceptance, cognitive defusion, and nonattachment among elite Chinese athletes ($n = 515$)

Effects	ES	95% CI		<i>p</i>
		LL	UL	
Direct effects				
Mindfulness → decentering	.601	.545	.657	<.001
Mindfulness → experiential acceptance	.236	.153	.319	<.001
Mindfulness → cognitive defusion	.213	.129	.296	<.001
Mindfulness → nonattachment	.419	.347	.492	<.001
Decentering → subjective well-being	.156	.077	.235	<.001
Experiential acceptance → subjective well-being	.087	-.029	.202	.141
Cognitive defusion → subjective well-being	.135	.020	.251	.022
Nonattachment → subjective well-being	.331	.250	.413	<.001
Indirect effects				
Mindfulness → decentering → subjective well-being	.094	.045	.143	<.001
Mindfulness → experiential acceptance → subjective well-being	.020	-.008	.049	.155
Mindfulness → cognitive defusion → subjective well-being	.029	.002	.056	.037
Mindfulness → nonattachment → subjective well-being	.139	.096	.181	<.001

ES effect size, CI confidence interval, LL lower limit, UL upper limit

Table 4 Effects from mindfulness to flourishing via the mediators of decentering, experiential acceptance, cognitive defusion, and nonattachment among elite Chinese athletes ($n = 515$)

Effects	ES	95% CI		<i>p</i>
		LL	UL	
Direct effects				
Mindfulness → decentering	.601	.545	.657	<.001
Mindfulness → experiential acceptance	.236	.153	.319	<.001
Mindfulness → cognitive defusion	.213	.129	.296	<.001
Mindfulness → nonattachment	.419	.347	.492	<.001
Decentering → flourishing	.179	.094	.263	<.001
Experiential acceptance → flourishing	.131	.008	.254	.037
Cognitive defusion → flourishing	.114	–.010	.237	.072
Nonattachment → flourishing	.167	.077	.257	<.001
Indirect effects				
Mindfulness → decentering → flourishing	.107	.055	.160	<.001
Mindfulness → experiential acceptance → flourishing	.031	.000	.062	.052
Mindfulness → cognitive defusion → flourishing	.024	–.004	.052	.091
Mindfulness → nonattachment → flourishing	.070	.030	.110	.001

ES effect size, CI confidence interval, LL lower limit, UL upper limit

effect of experiential acceptance on the path from mindfulness to athlete burnout is in line with the findings of a previous study (Zhang et al., 2016b). Findings of the current study indicated the importance of promoting experiential acceptance on reducing athlete burnout. Athletes can learn to increase their willingness to live with the unpleasant inner experiences via mindfulness practice to reduce their psychological suffering of the unwanted thoughts, emotions, and sensations (Birrer et al., 2019). To prevent athlete burnout, future mindfulness-based interventions in sporting contexts could consider teaching athletes to practice mindfulness skills to promote their experiential acceptance (Birrer et al., 2012).

The mediation effect of experiential acceptance on the path from mindfulness to subjective well-being was non-significant. This finding is in contrast with the theoretical proposition (Moore, 2009) and inconsistent with previous empirical findings on the significant relationship between experiential avoidance (the opposite of experiential acceptance) and well-being using daily diary analysis (Machell et al., 2015). In future, the mediating role of experiential acceptance on the path from mindfulness to subjective well-being needs to be further explored. Although the direct effect from experiential acceptance to flourishing was positive and significant, the mediation effect of experiential acceptance on the path from mindfulness to flourishing was marginal significant. A possible reason might be that athlete's ability to live with the unpleasant life experiences of training and competition can help reduce athlete burnout, but when it comes to growth-related flourishing, the ability of being non-active and being aware of the ongoing consciousness alone might not be sufficient to promote long-term personal growth.

The mediating role of cognitive defusion on the effect of mindfulness to athlete burnout was demonstrated. This finding is consistent with the principles of acceptance and commitment therapy (Hayes et al., 2006) and the mindfulness-acceptance-commitment approach (Gardner & Moore, 2007). It showed that the improvement of mindfulness can lead to the increase of the cognitive defusion of distancing from thoughts and experiencing the thoughts literally which could further reduce the rumination on the thoughts and feelings related to athlete burnout (Gardner & Moore, 2004). Therefore, future intervention studies could be conducted to further examine whether cognitive defusion mediated the effect from mindfulness to athlete burnout.

The mediating effect of cognitive defusion on the path from mindfulness to subjective well-being was demonstrated. In contrast, the mediating effect of cognitive defusion on the path from mindfulness to flourishing was non-significant. A potential reason for the non-significant mediating effect of cognitive defusion on the mindfulness-flourishing connection might be that flourishing is more of a personal growth concept that relates to optimal human functioning and performance (Ferguson et al., 2014; Fredrickson & Losada, 2005). In other words, there is a gap between cognitive defusion and flourishing. Nonetheless, more empirical evidence is needed to examine the mediation role of cognitive defusion on the mindfulness-flourishing path.

Decentering significantly mediated the effects from mindfulness to subjective well-being and flourishing. The findings are consistent with previous correlational evidence among mindfulness, decentering, athlete burnout, and subjective well-being in athletes (Zhang et al., 2017; Zhang et al., 2016a). The findings also provided empirical support that decentering can be incorporated into intervention

programs to explain the changing mechanism of the mindfulness-based intervention for promoting adaptive outcomes (Si et al., 2016). However, decentering did not mediate the effect from mindfulness to athlete burnout. This might be because emotional/physical exhaustion was used to represent athlete burnout. The problem is that exhaustion might be a little bit distant as a result of reduced sense of accomplishment and sport devaluation (Gustafsson et al., 2016). A further exploration of the mediating effect of decentering on the paths from mindfulness to the adaptive and maladaptive outcomes in randomized controlled trials is required (Zhang & Su, 2020).

The mediating effects of nonattachment on the paths from mindfulness to athlete burnout, subjective well-being, and flourishing were significant. These significant mediating effects of nonattachment on athlete burnout, subjective well-being, and flourishing provided support for the proposed mechanism of mindfulness of the Buddhist psychological model (Grabovac et al., 2011). Given the correlational nature of the findings, it is highly recommended that nonattachment can be incorporated into mindfulness training programs in a sports context using the design of randomized controlled trials to further explain the working mechanisms of how mindfulness can promote adaptive outcomes and reduce maladaptive outcomes (Si et al., 2016).

Limitations and Future Research

Limitations of the study should be acknowledged. First, the current study adopted a cross-sectional design, which lead us be cautious to interpret the causal relations among the key variables. Another key issue related to the cross-sectional design is that mediation analyses might be substantially biased, and the mediator might not have a mediating effect in a longitudinal analysis (Maxwell et al., 2011). Future research should consider a wide variety of mediation models such as the autoregressive models of change. Second, given that the key constructs are measured using self-reported scales, the current study might suffer from common method biases (Podsakoff et al., 2003). To reduce method biases, future studies may consider adopting preventive methods by separating the measure of mindfulness as a predictor, the mediators, and the adaptive and maladaptive outcome variables as well as adopting other procedural remedies such as maximizing respondent motivation and minimizing task difficulty (Podsakoff et al., 2012; Taris & Kompier, 2014). Third, flourishing was assessed using a self-designed three-item questionnaire. This is because that currently, there is a lack of well-developed sport-specific measure of flourishing for athletes. A sport-specific scale measuring flourishing in athletes can be developed in future based on the existing qualitative evidence (e.g., Ashfield et al., 2012; Ferguson et al., 2014, 2019). Fourth, we did not measure

sports performance in the current study. This is because it is difficult to assess the performance of athletes from different sports using a standard measure, in which the scoring methods of sport performance varied substantially. Future studies should consider collecting data from a certain type of sport and use a standard measure of sport performance. Fifth, we only examined four mediators in the current study and the test of mediators was not comprehensive. It is also worthy to further examine other mediators in a sports context such as rumination and emotion regulation (Josefsson et al., 2017, 2019). Adopting the design of randomized controlled trials to establish more robust evidence is highly recommended to test the causal effects explaining the changing mechanisms of mindfulness on adaptive and maladaptive outcomes in a sports context (Zhang & Baltzell, 2019).

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Author Contribution CQZ designed the study, performed the data analysis, and wrote the paper. XL contributed to the data collection. PKC designed the study. ZH contributed to the data collection. DB contributed to the data collection. DW contributed to the data collection and data input. YG contributed to the data collection and data input. XW contributed to the data collection and data input. GS designed the study and edited the manuscript. All authors approved the final version of the manuscript for submission.

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Data Availability Upon reasonable request, the data that support the findings of the current study are available from the corresponding author Chun-Qing Zhang, Ph.D. at zhangchq28@mail.sysu.edu.cn.

Declarations

Ethics Approval All research procedures received approval by the Research Ethics Committee (REC) at the Hong Kong Baptist University.

Informed Consent Informed consent was received from all individuals who participated in this research.

Competing Interests The authors declare no competing interests.

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