Personality Traits and Psychobiosocial States among Athletes: The Mediating Role of Dispositional Mindfulness

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Abstract

The aim of the current study was to ascertain the mediating role of dispositional mindfulness on the relationship between athletes' personality traits and functional/dysfunctional psychobiosocial states associated with performance. Italian athletes (N = 221, 112 female, Mage = 29.29 ± 9.55) involved in individual (n = 124) or team sports (n = 97) completed questionnaires assessing personality traits, dispositional mindfulness in sport context, and psychobiosocial states. Path analysis was conducted to test the mediation effects of mindfulness (awareness, non-judgmental attitude and refocusing) on the relationship between personality traits (conscientiousness and emotional stability) and psychobiosocial (functional and dysfunctional) states using maximum likelihood estimator (ML) and bias-corrected bootstrap method based on 5000 resamples. Gender and sport types were entered as covariates in the model. Path analysis revealed a significant positive indirect effect of conscientiousness on functional psychobiosocial states via awareness and refocusing dimensions, meanwhile emotional stability showed a positive indirect effect via refocusing. Moreover, a significant negative indirect effect of emotional stability on dysfunctional psychobiosocial states via non-judgmental attitude emerged. Findings suggest that conscientious and emotionally stable athletes are more prone to be mindfully aware of the present moment, to refocus on it, and to adopt a non-judgmental attitude. In turn, they can experience a higher level of functional psychobiosocial states associated with sport performance. Implications and directions for further research are discussed.

Keywords: conscientiousness, emotional stability, awareness, refocusing, sport performance

Personality Traits and Psychobiosocial States among Athletes: The Mediating Role of Dispositional Mindfulness

A substantial amount of research attention has been focused on the study of athletes' personality traits and their relationship with sport-related emotional experiences (Allen et al., 2014; Pineau et al., 2014) and performance (Allen et al., 2013; Laborde et al., 2020). Emotional experiences, defined in a holistic perspective as psychobiosocial states (Hanin, 2007), are argued to have a functional or dysfunctional impact on sport performance (Robazza et al., 2016). However, the interplay between personality traits and athletes' psychobiosocial states has not yet been adequately examined. To address this topic, we investigated the link between athletes' personality traits and performance-related psychobiosocial states, and the potential mediation effects of mindfulness on this relationship.

A widespread model used in studies on personality in sport is the Five-Factor Model, also known as the Big Five model (McCrae & John, 1992). According to McCrae and John, personality can be assessed through five trait dimensions or factors—neuroticism, extraversion, openness, agreeableness and conscientiousness—each incorporating more specific traits. For instance, neuroticism encompasses facets of anxiety, hostility, depression, self-consciousness, impulsiveness and vulnerability. In their literature review, Allen et al. (2013) found that athletes seem to be characterized by higher level of extraversion, conscientiousness, emotional stability and agreeableness compared to non-athletes. In addition, Piepiora (2021) found that champions of team sports tend to be more extraverted, open to experiences and with lower degree of neuroticism than other players.

Moreover, Allen et al. (2014) found that athletes' personality traits contributed to the negative emotions they experienced. More specifically, athletes who were more introverted, disagreeable, emotionally unstable, and/or less open to new experiences tended to react to

negative outcomes with more, more intense and long-lasting negative emotions. In addition, personality traits have been found to be related to the way athletes experience and regulate their emotions (Allen et al., 2013; Laborde et al., 2020). Given that emotions represent the main component of a range of psychobiosocial states (Hanin, 1997) that contribute to success in sport (Robazza & Ruiz, 2018), it is important to investigate the relationship between personality traits and psychobiosocial states.

According to the individual zones of optimal functioning (IZOF) model (Hanin, 1997), emotions can be viewed in a multidimensional manner and recognised as a fundamental component of an individual's experience (Hanin, 2007). Psychobiosocial states are conceptualized as situational, multimodal and dynamic expressions of the human functioning (Robazza et al., 2016). In sport, these states can be described as athlete's performance-related experiences that include psychological (affective, cognitive, motivational and volitional), biological (bodily-somatic and motor-behavioural) and social (operational and communicative) interrelated modalities (for a full discussion, see Ruiz et al., 2016; Ruiz & Robazza, 2020; for a review, see Ruiz et al., 2017). Within the affective modality, emotional experiences are conceptualized considering the interplay between valence (i.e., pleasant or unpleasant) and functionality (i.e., functional or dysfunctional effects on performance) which results in pleasant-functional (e.g., enthusiastic), pleasant-dysfunctional (e.g., complacent), unpleasant-functional (e.g., aggressive), and unpleasant-dysfunctional (e.g., apprehensive) states (Ruiz et al., 2016). Emotion-related psychobiosocial modalities comprise cognitive (e.g., focused, distracted), motivational (e.g., committed, uncommitted), volitional (e.g., determined, undetermined), bodily-somatic (e.g., physically-charged, exhausted), motor-behavioural (e.g., powerful-movement, powerless-movement), operational (e.g., effective-execution, ineffective-execution) and communicative (e.g., connected, withdrawn) feelings that can be functional or dysfunctional for performance.

Notably, conscientiousness and emotional stability have been shown to be positively correlated with positive emotionality (including pleasant affect, happiness and life satisfaction) and negatively correlated with negative emotionality (Allen et al., 2014). Based on these findings, the two traits might have important implications on athletes' psychobiosocial states.

To examine the relationship between personality traits and psychobiosocial states in athletes, we considered the possible mediating role of key components of dispositional mindfulness (i.e., awareness, non-judgmental attitude and refocusing). We hypothesised that personality traits, especially conscientiousness and emotional stability, may predict athletes' dispositional mindfulness, a natural and intrinsic tendency to pay attention mindfully to the surroundings and experiences (Wheeler et al., 2017) in sport-specific situations. Firstly, previous research revealed a strong correlation between these two personality traits and dispositional mindfulness (Hanley & Garland, 2017; Rau & Williams, 2016). A meta-analysis of 29 studies (Giluk, 2009) found a strong positive correlation between mindfulness and emotional stability (opposite to neuroticism) and a strong negative correlation with trait negative affect, which is highly correlated with neuroticism. Facets of mindfulness, such as acting with awareness, non-judging, non-reacting, were found to be negatively associated with neuroticism and positively associated with conscientiousness (Hanley, 2016). Secondly, conscientiousness and emotional stability seem to play a predictive role in the key components of mindfulness. Specifically, conscientious people adopt self-disciplined behaviours and restrain their adverse impulses, which requires being more focused on the present moment and acting with awareness. Individuals high in neuroticism are susceptible to negative emotions and find it difficult to self-regulate (Rau & Williams, 2016), which weakens one's non-judgmental attitude towards emotionally challenging events. Thus,

emotional stability trait may generate higher mindful acceptance and non-judgmental attitude towards negative events.

Although a large body of research has examined the associations between personality traits and mindfulness, their potential interplay in predicting psychobiosocial states in sport has not been investigated so far. To achieve and maintain high performance levels, athletes need to be aware of their psychobiosocial states and how these change during sport performance (Harmison, 2006). Here comes into play mindfulness, a moment-to-moment awareness that involves intentionally and non-judgmentally paying attention to the present moment (Kabat-Zinn, 2005), which can increase athletes' level of awareness of the psychobiosocial states they experience (Robazza & Ruiz, 2018; Ruiz & Robazza, 2020).

Mindful awareness enables athletes to notice their cognitions, emotions and bodily sensations that occur in the present moment, thereby promoting "distant" observation of these internal experiences without interacting with them. In a non-judgmental attitude athletes accept the present circumstances and their current thoughts and emotions without self-criticism (Thienot et al., 2014). Importantly, this non-judgmental attitude does not mean approving the present moment condition, but rather accepting the nature of the experience no matter its valence (Zhang et al., 2017). Mindful refocus allows athletes to quickly shift their attention on goal-related cues when facing disruptive stimuli by disengaging from elaborative processing, staying focused or swiftly refocusing on present relevant stimuli (Thienot et al., 2014). As previous research has highlighted, our understanding of the influence of mindfulness on performance or performance-related experiences is limited because most studies explored the impact of mindfulness as one construct without examining the influence of single components of mindfulness (Birrer et al., 2012; Rau & Williams, 2016; Röthlin et al., 2016; Sparks et al., 2021). Therefore, we aimed to investigate separately the mediating role of awareness, non-judgment and refocusing components.

In sport, the ability to mindfully accept dysfunctional, pleasant or unpleasant states in a given situation, focus on the present moment and redirect one's attention to the task at hand can help athletes remain in an optimal performance state (Robazza & Ruiz, 2018). Importantly, dispositional mindfulness has been found to protect from psychological distress (Brown & Ryan, 2003). Studies have shown that people with high dispositional mindfulness are able to better regulate their emotions (Wheeler et al., 2017). Emotion regulation, a key component of the broader construct of self-regulation, is the capacity to generate, sustain and tolerate emotional states, and also to modify the type, quality, intensity or frequency of an emotion. Based on the process model of emotion regulation (Gross, 2014), mindfulness can be considered exerting a primary impact during attentional deployment in the emotion generative process (Robazza & Ruiz, 2018).

Study Purpose

Rau and Williams (2016) in their critical review of construct validation of dispositional mindfulness emphasised the need for more empirical studies examining the relationship between personality traits and facets of mindfulness to define possible mechanisms by which these individual differences affect emotional processes.

Therefore, the current study aimed at investigating the relationships between adult athletes' personality dimensions and functional/dysfunctional psychobiosocial states associated with optimal and poor performance. We also investigated the mediating role of mindfulness in the relationship between personality traits and psychobiosocial states in a sample of athletes drawn from different sport disciplines competing at regional or higher level. Capturing possible mechanisms on how personality traits influence athletes' ability to regulate psychobiosocial states may serve to inform theories related to personality and mindfulness, and may also provide valuable insights regarding the mechanisms by which mindfulness promotes well-being. Based on the research findings previously discussed, we

hypothesised emotional stability and conscientiousness to be positively linked to functional psychobiosocial states and negatively linked to dysfunctional psychobiosocial states. We also expected dispositional mindfulness to mediate the relationship between personality traits and psychobiosocial states.

Method

Participants

The main hypotheses of the study were tested using path analysis. According to a rule of thumb proposed by several authors (e.g., Hair et al., 2019; Kline, 2016), a minimum sample size in terms of the ratio of the number of cases and the number of model parameters to be estimated is 10. In our model we had 20 parameters to estimate, which therefore required a minimum sample of 200 participants. We also computed the minimum sample size for root-mean-square error of approximation (RMSEA) using the code developed by Preacher and Coffman (2006) for the R program (https://cran.r-project.org/). A sample size of 165 resulted after entering alpha = .05, df = 20, power = .80, and alternative RMSEA = .08 (a threshold for an acceptable fit).

A total of 231 participants were involved in the current cross-sectional study. Ten of them were not practicing sport and their data were therefore excluded leading to a final sample of 221 Italian athletes (109 men, 112 women; M_{age} = 29.29, *SD* = 9.55). The participants were recruited form 24 individual sports (*n* = 124) and 8 team sports (*n* = 97). One hundred and fifty-two athletes competed at a professional level (78 women) and 69 at an amateur level (34 women). The mean years of sport participation was 13.66 (*SD* = 10.02) for men and 10.39 (*SD* = 6.98) for women.

Procedure

The study procedure followed the ethical standards outlined in the Declaration of Helsinki and has been approved by the local university ethical committee. The target group

for data collection were athletes over 18 years old who competed on at least regional level. Recruitment of participants occurred by snowball sampling, a type of non-probability sampling where current participants recruit additional participants (Sadler et al., 2010). Initial participants were identified via Italian sport psychologists, sport clubs, sport universities and their staff and were informed about the purpose of the study. They emailed the link to the online survey and distributed it via social network platforms. At the beginning of the online questionnaire athletes were informed about the purpose of the study and the completely voluntary and anonymous nature of participation. After the informed consent was signed, participants completed the questionnaire in Italian language that consisted of sociodemographic questions (e.g., age, gender, years of practice) as well as measurements of mindfulness, personality traits and psychobiosocial states.

Measures

Mindfulness Inventory for Sport (MIS) Scale.

The MIS (Thienot et al., 2014) is a context-specific instrument that measures trait mindfulness in sport. This scale consists of 15 items distributed over three subscales, each formed by five items: mindful awareness (e.g., “I am aware of the thoughts that are passing through my mind.”), non-judgemental attitude (e.g., “When I become aware that I am really upset because I am losing, I criticise myself for reacting this way”), and refocusing (e.g., “When I become aware that I am tense, I am able to quickly bring my attention back to what I should focus on”). The scale was adapted to the Italian language using back-translation procedures (Brislin, 1986) and the results of the confirmatory factor analysis (CFA) and the corresponding fit indices can be found in the results section. Similarly to the original English version, the items in the non-judgmental subscale were reverse scored and the mean of the items was calculated for each subscale. Athletes were asked to indicate on a scale from 1 (not at all) to 6 (very much) how much each statement reflected their recent experience in sport.

The factor structure of the MIS scale has been supported by previous research (Thienot et al., 2014) showing acceptable internal consistency (alpha coefficients) of the subscale scores of mindful awareness (.77), non-judgemental attitude (.78) and refocusing (.77).

Revised Italian Version of the Ten-Item Personality Inventory (I-TIPI-R)

Athletes' personality traits were measured on the I-TIPI-R (Chiorri et al., 2015), a brief measure that was originally developed by Gosling et al. (2003) which consists of two descriptors for each of the Big Five personality dimensions, namely extraversion, agreeableness, conscientiousness, emotional stability and openness to experience. Participants were asked to indicate on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree) how well each pair of adjectives described them. Previous research supported the five-factorial structure of the scale, and found a .55 average index of internal consistency (Chiorri et al., 2015) which, could have been expected due to the low number of items. Despite the brevity of the scale, the subscales have shown satisfactory psychometrical properties with adequate test–retest reliability (from .79 to .90) and concurrent validity with various questionnaires, such as the 44-item long Big Five Inventory (Chiorri et al., 2015, Myszkowski et al., 2019).

Psychobiosocial States Scale, Trait Version (PBS-ST)

To assess the athletes' experiences associated with successful and poor performances the PBS-ST (Robazza et al., 2016) was adopted. The PBS-ST scale was developed based on the English version of the Individualized Profiling of Psychobiosocial States (Ruiz et al., 2016) and has been adapted to the Italian language. The scale consists of 15 items (8 functional items and 7 dysfunctional items) intended to measure affective, cognitive, motivational, volitional, bodily-somatic, motor-behavioural, and operational modalities of a performance-related state. Each item includes 3 or 4 descriptors of a similar experience that have a functional (+) or dysfunctional (-) influence on sport performance. Specifically, three

rows of synonym adjectives assess the affective modality for: functional pleasant states (+), 'enthusiastic, confident, carefree, joyful'; dysfunctional anxiety (-), 'worried, apprehensive, concerned, troubled'; and functional anger (+), 'fighting spirit, fierce, aggressive'. The other 12 items comprise adjectives that describe functional or dysfunctional states related to the other 6 modalities (2 items per modality). For instance, the functional motivational (+) modality includes the 'motivated, committed, inspired' adjectives, while the dysfunctional motivational (-) modality includes 'unmotivated, uninterested, uncommitted'. For each item of the scale athletes were requested to select one or more descriptors that best reflected the state they usually experience during optimal performance. Then, they were asked to rate the intensity of the selected functional and dysfunctional states on a 6-point scale ranging from 0 (not at all) to 6 (very, very much). Next, athletes were asked to rate the same items again, but this time thinking about their nonoptimal sport performance. Thus, we measured psychobiosocial states based on athletes' retrospective reports of what they typically experience during optimal and nonoptimal performance. As previous research highlighted (e.g., Morano et al., 2020; Nateri et al., 2020; Robazza et al., 2016), the PBS-ST measure has been successfully used to assess the intensity of the eight interrelated modalities of the psychobiosocial states. The mean of the functional psychobiosocial states related to optimal performance and the mean of the dysfunctional states related to nonoptimal performance were computed for statistical analyses. For the Italian version of the PBS-ST previous research supported a two-factor solution (i.e., functional and dysfunctional intensity subscales) to be acceptable with CFI = .942, TLI = .931, RMSEA (90% CI) = .050 (.035 ± .064), and SRMR = .051 in Italian male and female athletes coming from various individual and team sports (Robazza et al., 2016).

Data Analysis

Data were initially screened for missing values, potential univariate or multivariate outliers and assumptions of normality (Tabachnick & Fidell, 2019). To examine the factorial validity of the MIS scale adapted to the Italian language a CFA was carried out with Mplus version 8.5 (Muthén & Muthén, 2017) on the data of the whole sample. The maximum likelihood (MLM) estimator to identify maximum likelihood parameter estimates with standard errors and a mean-adjusted chi square (χ^2) test statistic were applied, which are robust to non-normality. Model fit was assessed using χ^2, normed chi-square (χ^2/df), comparative fit index (CFI), Tucker–Lewis index (TLI), root-mean-square error of approximation (RMSEA), and standardized root mean square residual (SRMR). According to the generally used indications, a relatively good model fit is inferred with the following values: χ^2/degree of freedom (df) lower than 5.00, CFI and TLI close to .95, RMSEA from .05 to .08, and an SRMR smaller than .05 (Hu & Bentler, 1999). Internal consistency was assessed for each subscale of the MIS via Cronbach's alpha (α) and omega (ω) coefficients, and a value higher than .70 was considered as acceptable (Watkins, 2017).

Descriptive statistics and Pearson correlations were computed for all the examined variables, namely mindful awareness, non-judgemental attitude, refocusing, extraversion, agreeableness, conscientiousness, emotional stability, openness to experience, functional psychobiosocial states related to optimal performance and dysfunctional states related to nonoptimal performance. Multivariate analysis of variance (MANOVA) was performed on the mean scores of the dependent variables to examine differences by gender and sport type (individual and team) categories. Finally, path analysis was conducted to test the mediation effects of mindfulness on the relationship between personality traits and psychobiosocial states. To test the significance of the indirect effects the bias-corrected bootstrap method was employed based on 5000 resamples and bias-corrected 95% confidence intervals (Cis).

Bootstrap 95% Cis not including the zero value suggest that the indirect paths are significant at $p < .05$.

Transparency and Openness

We report how we determined our sample size, reason for data exclusions, the procedure and all measures in the study. Anonymised data and Mplus syntax are available on Open Science Framework (https://osf.io/y3zrc/?view_only=d098c86d9b6c429981afa1b4da385925; Bondár et al., 2022). We followed the APA standards for reporting quantitative research (Appelbaum et al., 2018). The study was not pre-registered.

Results

The whole sample showed no missing data or multivariate outliers, therefore the final sample included the 221 eligible participants. Fit indices from CFA supported the three-factor structure of the MIS scale in our sample: χ^2 (87) = 156.049, χ^2/df = 1.79, CFI = .958, TLI = .949, RMSEA (90% CI) = .051 (.034 – .067), and SRMR = .056. Good reliability indices were found for awareness (α = .872; ω = .874), non-judgmental attitude (α = .747; ω = .751) and refocusing subscales (α = .863; ω = .865).

Descriptive statistics and Pearson product-moment correlation coefficients for the data of the whole sample are reported in Table 1. We found small correlations between some subscale scores of I-TIPI and PBS-ST. Similarities between the adjectives from the two scales might partially explain the correlations. Specifically, we found similarity between the item of extraversion (i.e., enthusiastic) and one adjective from the pleasant affective modality of the PBS-ST, between the item of conscientiousness (e.g., self-disciplined, careless) and adjectives from the volitional modality (e.g., purposeful, unwilling) and between one item from neuroticism and the anxiety modality. Moreover, conscientiousness was correlated with mindful awareness and refocusing, and emotional stability was correlated with non-

judgmental attitude and refocusing subscales; agreeableness, openness to experience and extraversion personality dimensions were not significantly correlated with any of the components of mindfulness (see Table 1). To not generate an excessive number of paths to estimate (Hair et al., 2019; Kline, 2016) and include the essential variables only, we considered conscientiousness and emotional stability in path analysis. As mentioned in the introduction, previous research has indicated that these are personality dimensions most likely related to psychobiosocial states and dispositional mindfulness (e.g., Allen et al., 2014; Giluk, 2009; Hanley, 2016; Hanley & Garland, 2017; Rau & Williams, 2016; Spinhoven et al., 2017).

MANOVA yielded significant results by sport type category, Pillai's trace = .083, $F(10, 208) = 1.89$, $p = .048$, $\eta_p^2 = .083$, while significant differences did not emerge by gender ($p = .084$) or gender by sport type interaction ($p = .523$). Univariate follow-up showed team sport athletes to report significantly higher scores in emotional stability and lower scores in dysfunctional psychobiosocial states compared with athletes involved in individual sports.

Path analysis was conducted to examine the relationship between personality traits, mindfulness and psychobiosocial states. To control for gender and sport type categories (team, individual) they were entered as covariates in the analyses. The model fitted the data well, $\chi^2 (4) = 7.072$, CFI = .989, TLI = .902, RMSEA (90% CI) = .059 (.000 – .129), and SRMR = .024. Significant ($p < .05$) standardized path coefficients are presented in Figure 1 and total, direct, and indirect effects for the paths in Table 2. In line with theoretical expectations, results indicated a significant negative direct effect of emotional stability on dysfunctional psychobiosocial states ($\beta = –.195$, 95% CI = –.325 to –.063). Significant positive indirect effects of conscientiousness on functional psychobiosocial states via awareness ($\beta = .061$, 95% CI = .024 to .113) and via refocusing ($\beta = .088$, 95% CI = .041 to

.152) were found. Moreover, a significant positive indirect effect of emotional stability on functional states via refocusing (β = .095, 95% CI = .047 to .157) emerged. Finally, a significant negative indirect effect of emotional stability was found on dysfunctional psychobiosocial states via non-judgmental attitude (β = –.078, 95% CI = –.135 to .037).

Discussion

In the current study, we examined the relationship between personality traits (i.e., conscientiousness and emotional stability) and athletes' psychobiosocial states, and the mediation effects of dispositional mindfulness on this link in a sample of Italian athletes. Overall, findings suggest that conscientious and emotionally stable athletes are more prone to be mindfully aware of the present moment, to refocus on it, and to adopt a non-judgmental attitude, which leads them to experience a higher level of functional psychobiosocial states associated with sport performance. The hypothesis that dispositional mindfulness mediates the relationship between personality traits and psychobiosocial states was partly confirmed. Findings of this study provided preliminary empirical support on mindful awareness, refocusing and non-judgmental attitude as potential mediators from personality traits to functional and dysfunctional psychobiosocial states associated with sport performance.

Personality Traits and Psychobiosocial States

A significant indirect link was found between emotional stability and functional states via refocusing. A possible explanation could be that emotionally stable athletes are more prone to cognitive and emotional flexibility which may enhance their ability to refocus on the task at hand (Birrer et al., 2012) and in consequence allow them to experience higher level of functional psychobiosocial states associated with optimal performance.

We found an indirect relationship between athletes' conscientiousness and psychobiosocial states via awareness and refocusing. The indirect links could be explained by the implications of the facets of conscientiousness, such as diligence and responsibility, and

of the components of mindfulness in successfully managing stressful events (e.g., sport competitions; Steca et al., 2018). This may lead to experiencing more functional psychobiosocial states (Robazza & Ruiz, 2018).

A direct negative link was observed between emotional stability and dysfunctional psychobiosocial states which suggests that athletes with higher level of emotional stability tend to experience a lower level of dysfunctional states associated with poor performance. This finding is in line with previous research indicating that emotional instability contributes to a greater number of negative emotions (Allen et al., 2014). The negative link might be due to the facets of emotional stability, such as the capacity to manage stress and emotions, which are required abilities in reaching functional psychobiosocial states (Robazza & Ruiz, 2018). It is worth noting that some characteristics of the sport domain, including competition, injuries and travelling, might provide athletes with a variety of situations that challenge their emotional stability (Steca et al., 2018) and their ability to manage dysfunctional psychobiosocial states.

The Mediating Role of Awareness

Based on our findings, mindful awareness seems to play a mediating role in the positive relationship between conscientiousness and functional psychobiosocial states associated with optimal performance (see Figure 1). The theoretical relationship between conscientiousness and mindfulness somehow underpins the above findings. Self-discipline, self-regulations, and thoughtful and deliberate response that characterise conscientiousness demonstrated significant positive associations with dispositional mindfulness (Giluk, 2009) and acting with awareness (Hanley & Garland, 2017). However, Rau and Williams (2016) in their critical review of dispositional mindfulness, which examined the convergent and discriminant validity across personality domains, highlighted the need for a closer examination of mindfulness at the facet level. Moreover, the authors argued that dispositional

mindfulness is a multidimensional, independent construct and empirical investigations are required to clarify possible mechanisms by which personality traits and mindfulness components influence emotional processes. A possible explanation of the current results can be that conscientious athletes tend to engage more often in being mindfully aware of their thoughts, emotions and bodily sensations in order to self-regulate. As previous research highlighted, athletes who have a trait-like ability to be mindful in daily life tend to manifest enhanced task relevant attention without engaging in behaviours like excessive rumination or avoidance (Moore, 2016). This can lead to expressing functional responses to task-related demands. Consequently, conscientious athletes tend to be more often mindfully aware which may contribute to reaching functional intensity in some psychobiosocial states such as those related to attention and alertness (Ruiz et al., 2016). This potential predictor (conscientiousness)–mediator (awareness)–outcome (psychobiosocial states) path towards which the current results are pointing may contribute to delineating mechanisms by which personality, mindfulness and emotion-related states are intertwined.

The Mediating Role of Refocusing

Interestingly, emotional stability and conscientiousness were indirectly linked to functional psychobiosocial states through refocusing. Previous research already highlighted that athletes with high levels of conscientiousness, extraversion and/or emotional stability are more likely to adopt problem-focused coping strategies (Allen et al., 2013) and additional behavioural strategies supporting their long-term goals (Hanley & Garland, 2017). Thus, such personality traits may stimulate individuals to refocus on the problem at hand. The ability to refocus can increase functional psychobiosocial states such as those related to feelings of commitment and persistence in achieving a performance goal. Furthermore, some researchers argued that mindfulness is strongly linked to self-control, more specifically to the type of self-control characterized by the ability to override or change one’s inner reactions (thoughts

and emotions) and stopping impulses (Bowlin & Baer, 2012). In this manner, mindful people can invest greater attention on adjusting their behaviour that is consistent with their goals and values regardless of the thoughts and feelings they experience (Birrer et al., 2012). This can provide them with effective mental and physical responses to emotional disruptive situations and a higher level of functional psychobiosocial states. Therefore, a possible explanation of the mediating role of refocusing could be that conscientious and emotionally stable athletes are more predisposed to redirect their attention to the current situation leading them to experience a higher level of functional states during sport performance.

The Mediating Role of Non-judgmental Attitude

The current results indicate that non-judgmental attitude plays a mediating role in the negative relationship between emotional stability and dysfunctional psychobiosocial states (see Figure 1). This finding is consistent with previous research highlighting that neurotic (opposite to emotionally stable) people are inclined to be emotionally sensitive and highly reactive, showing self-regulatory deficits on both emotional and behavioural levels (Hanley & Garland, 2017; Rau & Williams, 2016). On the other hand, emotionally stable athletes were found to experience fewer counterfactual thoughts about how personal or situational factors could have improved outcomes (Allen et al., 2014). This evidence is connected to the duration and overproduction of negative emotions. Accordingly, our results suggest that emotionally stable athletes are more predisposed to be non-judgmental towards present events. People who usually adopt a non-judgmental attitude view internal experiences as naturally occurring, unthreatening and time-limited (Gardner & Moore, 2012). This attitude tends to improve executive functions (e.g., decision-making; Riggs et al., 2015) and well-being (Brown & Ryan, 2003). Moreover, Teper and Inzlicht (2014) found that individuals who reported a high level of non-judgmental acceptance of thoughts and emotions displayed less affective reactivity. Along these lines, our results suggest that emotionally stable athletes

are more inclined to adopt a non-judgmental attitude towards present events, having a better ability of initiating higher-order processes and managing emotional disruptive states. In consequence, they might navigate situations more successfully and go through less dysfunctional states.

In contrast, no mediation effect of non-judgmental attitude was found in the relationship between conscientiousness and psychobiosocial states. A possible explanation could be drown based on previous evidence on the associations among facets of mindfulness and conscientiousness (Hanley, 2016; Teper & Inzlicht, 2014). Hanley found a negative association between non-reacting and conscientiousness. The author argued that non-reacting is in contrast with the achievement striving and goal directedness facets of conscientious personality, which implies clinging to thoughts and feelings. Consistently with our findings, Temper and Inzlicht showed conscientiousness to be inversely associated with the acceptance facet of mindfulness. Thus, a potential reason for the lack of mediation effect of non-judgmental attitude may be that conscientiousness (i.e., self-discipline) stimulates those aspects of mindfulness that are associated with deliberate attentional control (i.e., awareness and refocusing), without implying acceptance and non-judgmental attitude towards thoughts and emotions.

Limitations and Future Research Directions

Some methodological limitations of the present study need to be recognized. Due to the limitations of a cross-sectional design, we cannot infer causal relations between the variables. However, our findings can provide a framework for future longitudinal research and experimental studies aimed to optimize psychobiosocial states in athletes. Another key issue related to the study design is that in cross-sectional mediation analyses the role of time is not considered, which might lead to underestimate or overestimate longitudinal parameters

(Maxwell et al., 2011). Therefore, future studies should consider a variety of possible mediation models (e.g., the autoregressive models of change).

Given that all constructs were measured at the same point in time using self-report data, common method biases might have affected the current results (Podsakoff et al., 2003), even though we provided a rationale for conducting the study, informed participants on how the data gathered would be used and ensured anonymity of responses (Podsakoff et al., 2012). To mitigate potential method biases, future research may consider adopting preventive procedural methods such as separating the assessment of personality predictors from mediators and outcome variables over time.

Alternative models might be possible, for example, personality traits could be included as moderators of the relationship between dispositional mindfulness and psychobiosocial states. We opted for investigating the mediating role of the components of mindfulness because sport psychology research has already shown that these are amenable to well-developed mindfulness-based interventions (Noetel et al., 2019; Pineau et al., 2014). Moreover, deliberate mindfulness practice has been found to lead, relatively quickly, to higher trait mindfulness (in approximately five weeks; Bühlmayer et al., 2017) and to changes in one's relationship to personal thoughts and emotions (Noetel et al., 2019; Wheeler et al., 2017). These changes are highly relevant when working on athletes' psychobiosocial states and the chosen model can provide useful insight into the nature and function of individual differences in athletes' personality traits and dispositional mindfulness. Interestingly, modern personality trait theories emphasize that personality traits are susceptible to changes, especially in response to clinical interventions (for a comprehensive review, see Roberts et al., 2017). In a recent study, Atherton et al. (2021) found a remarkable degree of consistency of personality traits over more than 20 years. Observing the

longitudinal development of personality traits and components of mindfulness could be an interesting avenue in future sport psychology research.

Another limitation in the study is the exclusive use of self-report inventories which does not allow for exploring psychobiosocial states during actual sport performance. Finally, without an objective measure of performance we cannot draw conclusion on the implications of the personality traits and mindfulness in actual sport performance.

Growing body of research has indicated that deliberate mindfulness practice may generate changes on state (temporal changes in behaviour) and trait levels (changes in disposition toward mindfulness as a trait; Tang et al., 2016; Wheeler et al., 2017). Therefore, future experimental studies may consider applying the measures used in the current study at different time points before and after a mindfulness-based intervention to identify trait changes. This could also contribute to a better understanding of how much deliberate mindfulness practice has lasting effect on dispositional mindfulness and implicitly on the relationship between personality traits and psychobiosocial states. Including broader personality trait dimensions (see Allen et al., 2014) might shed light on further mechanisms between personality traits and the multidimensional expressions of emotional states.

Together with investigating the link between athletes' personality traits, dispositional mindfulness and psychobiosocial states, future research may also consider exploring athletes' appraisals of the competitive situations. For instance, athletes' emotions may vary based on how they interpret demanding events: challenging (eliciting confidence) or threatening (eliciting worry; Jones et al., 2009). These appraisals could have a major impact on the degree of functionality of psychobiosocial states athletes experience during performance (Robazza & Ruiz, 2018).

Conclusion

A growing body of research has shown a link between mindfulness and performance under pressure (Sparks et al., 2021), and between personality traits and performance-related measures (Allen et al., 2013), but the possible mechanisms between the three have yet to be explored. Despite the limitations of the current study, the mediating role of the mindfulness dimensions might add to the current knowledge. Our results indicated that emotional stability trait, opposite to neuroticism, was related to higher level of functional psychobiosocial states through refocusing and to less dysfunctional states through non-judgmental attitude. Additionally, it has already been suggested that mindfulness protects athletes in demanding situations from the effects of their worry-related thoughts on their behaviour (Röthlin et al., 2016) and that weakens the relationship between neuroticism and clinical issues (e.g., Tucker et al., 2014). Therefore, from an applied point of view, providing athletes with cognitive and emotional flexibility through mindfulness-based interventions can contribute not only to performance enhancement (e.g., Baltzell, 2016) and cope with competitive pressure (e.g., Gardner & Moore, 2012), but also to the protection against the development of mental health issues.

References

Allen, M. S., Greenlees, I., & Jones, M. (2013). Personality in sport: A comprehensive review. *International Review of Sport and Exercise Psychology*, *6*(1), 184-208. https://doi.org/10.1080/1750984X.2013.769614

Allen, M. S., Greenlees, I., & Jones, M. V. (2014). Personality, counterfactual thinking, and negative emotional reactivity. *Psychology of Sport and Exercise, 15*(2), 147–154. https://doi.org/10.1016/j.psychsport.2013.10.011

Appelbaum, M., Cooper, H., Kline, R. B., Mayo-Wilson, E., Nezu, A. M., & Rao, S. M. (2018). Journal article reporting standards for quantitative research in psychology: The APA Publications and Communications Board task force report. *American Psychologist*, *73*(1), 3-25. http://dx.doi.org/10.1037/amp0000191

Atherton, O. E., Grijalva, E., Roberts, B. W., & Robins, R. W. (2021). Stability and Change in Personality Traits and Major Life Goals From College to Midlife. *Personality and Social Psychology Bulletin*, *47*(5), 841–858. https://doi.org/10.1177/0146167220949362

Baltzell, A. L. (2016). Mindfulness and performance. In I. Ivtzan & T. Lomas (Eds.). *Mindfulness in positive psychology: The science of meditation and wellbeing* (pp. 64–79). Routledge.

Birrer, D., Röthlin, P., & Morgan, G. (2012). Mindfulness to enhance athletic performance: Theoretical considerations and possible impact mechanisms. *Mindfulness, 3*(3), 235–246. https://doi.org/10.1007/s12671-012-0109-2

Bondár, R. Z., Robazza, C., di Fronso, S., & Bertollo, M. (2022, April 26). Personality traits, dispositional mindfulness and psychobiosocial states among athletes. Retrieved from osf.io/y3zrc

Bowlin, S.L., & Baer, R. (2012). Relationships between mindfulness, self-control, and psychological functioning. *Personality and Individual Differences*, *52*, 411-415. https://doi.org/10.1016/j.paid.2011.10.050

Brislin, R. (1986). Field methods in cross-cultural psychology. In W. J. Lonner & J. W. Berry (Eds.), *The wording and translation of research instruments*. Sage Publications.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*, 822–848. https://doi.org/10.1037/0022-3514.84.4.822

Bühlmayer, L., Birrer, D., Röthlin, P., Faude, O., & Donath, L. (2017). Effects of mindfulness practice on performance-relevant parameters and performance outcomes in sports: A meta-analytical review. *Sports Medicine*, *47*(11), 2309-2321. https://doi.org/10.1007/s40279-017-0752-9

Chiorri, C., Bracco, F., Piccinno, T., Modafferi, C., & Battini, V. (2015). Psychometric properties of a revised version of the Ten Item Personality Inventory. *European Journal of Psychological Assessment, 31*(2), 109–119. https://doi.org/10.1027/1015-5759/a000215

Gardner, F. L., & Moore, Z. E. (2012). Mindfulness and acceptance models in sport psychology: A decade of basic and applied scientific advancements. *Canadian Psychology/Psychologie Canadienne, 53*(4), 309–318. https://doi.org/10.1037/a0030220

Giluk, T. L. (2009). Mindfulness, Big Five personality, and affect: A meta-analysis. *Personality and Individual Differences*, *47*(8), 805-811. https://doi.org/10.1016/j.paid.2009.06.026

Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality, 37*(6), 504–528. https://doi.org/10.1016/S0092-6566(03)00046-1

Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (2nd ed., pp. 3–20). The Guilford Press.

Hair, J. F. Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage.

Hanin, Y. L. (1997). Emotions and athletic performance: Individual Zones of Optimal Functioning model. *European Yearbook of Sport Psychology*, *1*, 29–72.

Hanin, Y. L. (2007). Emotions in sport: Current issues and perspectives. In G. Tenenbaum & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 31–58). John Wiley & Sons, Inc.

Hanley, A. W. (2016). The mindful personality: Associations between dispositional mindfulness and the Five Factor Model of personality. *Personality and Individual Differences, 91*, 154-158. https://doi.org/10.1016/j.paid.2015.11.054

Hanley, A. W. & Garland, E. L. (2017). The mindful personality: a meta-analysis from a cybernetic perspective. *Mindfulness*, *8*(6), 1456–1470. https://doi.org/10.1007/s12671-017-0736-8

Harmison, R. J. (2006). Peak performance in sport: Identifying ideal performance states and developing athletes' psychological skills. *Professional Psychology: Research and Practice*, *37*(3), 233. https://doi.org/10.1037/2157-3905.1.S.3

Hu, L.-t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Jones, M., Meijen, C., McCarthy, P. J., & Sheffield, D. (2009). A theory of challenge and threat states in athletes. *International Review of Sport and Exercise Psychology, 2*(2), 161–180. https://doi.org/10.1080/17509840902829331

Kabat-Zinn, J. (2005*). Coming to our senses: Healing ourselves and the world through mindfulness*. Hyperion.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4rd ed.). The Guilford Press.

Laborde, S., Allen, M. S., Katschak, K., Mattonet, K., & Lachner, N. (2020). Trait personality in sport and exercise psychology: A mapping review and research agenda. *International Journal of Sport and Exercise Psychology*, *18*(6), 701-716. https://doi.org/10.1080/1612197X.2019.1570536

Maxwell, S. E., Cole, D. A., & Mitchell, M. A. (2011). Bias in cross-sectional analyses of longitudinal mediation: Partial and complete mediation under an autoregressive model. *Multivariate Behavioral Research*, *46*(5), 816–841. https://doi.org/10.1080/00273171.2011.606716

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality*, *60*(2), 175-215. https://doi.org/10.1111/j.1467-6494.1992.tb00970.x

Moore, Z. (2016). Mindfulness, emotion regulation, and performance. In A. Baltzell (Ed.), *Mindfulness and performance* (pp. 29–52). Cambridge University Press.

Morano, M., Bortoli, L., Ruiz, M. C., & Robazza, C. (2020). Psychobiosocial States as Mediators of the Effects of Basic Psychological Need Satisfaction on Burnout Symptoms in Youth Sport. *International Journal of Environmental Research and Public Health*, *17*(12), 4447. https://doi.org/10.3390/ijerph17124447

Muthén, L.K., & Muthén, B.O. (2017). *Mplus user's guide* (8th ed.). Muthén & Muthén.

Myszkowski, N., Storme, M., & Tavani, J. L. (2019). Are reflective models appropriate for very short scales? Proofs of concept of formative models using the Ten-Item Personality Inventory. *Journal of Personality*, *87*(2), 363–372. https://doi.org/10.1111/jopy.12395

Nateri, R., Robazza, C., Tolvanen, A., Bortoli, L., Hatzigeorgiadis, A., & Ruiz, M. C. (2020). Emotional Intelligence and Psychobiosocial States: Mediating Effects of Intra-Team Communication and Role Ambiguity. *Sustainability*, *12*(21), 9019. https://doi.org/10.3390/su12219019

Noetel, M., Ciarrochi, J., Van Zanden, B., & Lonsdale, C. (2019). Mindfulness and acceptance approaches to sporting performance enhancement: A systematic review. *International Review of Sport and Exercise Psychology, 12*(1), 139-175. https://doi.org/10.1080/1750984X.2017.1387803

Piepiora P. (2021). Assessment of personality traits influencing the performance of men in team sports in terms of the Big Five. *Frontiers in Psychology*, *12*, 679724. https://doi.org/10.3389/fpsyg.2021.679724

Pineau, T. R., Glass, C. R., & Kaufman, K. A. (2014). Mindfulness in sport performance. In A. Ie, C. T. Ngnoumen & E. J. Langer (Eds.), *Handbook of mindfulness* (pp. 1004-1033). Wiley-Blackwell. https://doi.org/10.1002/9781118294895.ch52

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *The Journal of Applied Psychology*, *88*(5), 879–903. https://doi.org/10.1037/0021-9010.88.5.879

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*(1), 539–569. https://doi.org/10.1146/annurev-psych-120710-100452

Preacher, K. J., & Coffman, D. L. (2006, May). *Computing power and minimum sample size for RMSEA [Computer software]*. Available from http://quantpsy.org/.

Rau, H.K., & Williams, P.G. (2016). Dispositional mindfulness: A critical review of construct validation research. *Personality and Individual Differences, 93*, 32-43. https://doi.org/10.1016/j.paid.2015.09.035

Riggs, N. R., Black, D. S., & Ritt-Olson, A. (2015). Associations between dispositional mindfulness and executive function in early adolescence. *Journal of Child and Family Studies, 24*(9), 2745–2751. https://doi.org/10.1007/s10826-014-0077-3

Robazza, C., Bertollo, M., Ruiz, M. C., & Bortoli, L. (2016). Measuring psychobiosocial states in sport: Initial validation of a trait measure. *PLoS One*, *11*(12), e0167448. https://doi.org/10.1371/journal.pone.0167448

Robazza, C., & Ruiz, M. C. (2018). Emotional Self-Regulation in Sport and Performance. In *Oxford Research Encyclopedia of Psychology*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190236557.013.154

Roberts, B. W., Luo, J., Briley, D. A., Chow, P. I., Su, R., & Hill, P. L. (2017). A systematic review of personality trait change through intervention. *Psychological Bulletin, 143*(2), 117–141. https://doi.org/10.1037/bul0000088

Röthlin, P., Horvath, S., Birrer, D., & Grosse Holtforth, M. (2016). Mindfulness promotes the ability to deliver performance in highly demanding situations. *Mindfulness, 7*(3), 727-733. https://doi.org/10.1007/s12671-016-0512-1

Ruiz, M. C., Hanin, Y., & Robazza, C. (2016). Assessment of performance-related experiences: An individualized approach. *The Sport Psychologist, 30*(3), 201–218. https://doi.org/10.1123/tsp.2015-0035

Ruiz, M. C., Raglin, J. S., & Hanin, Y. L. (2017). The individual zones of optimal functioning (IZOF) model (1978-2014): Historical overview of its development and

use. *International Journal of Sport and Exercise Psychology, 15*(1), 41–63. https://doi. org/10.1080/1612197X.2015.1041545

Ruiz, M. C., & Robazza, C. (2020). Emotion regulation. In D. Hackfort & R. J. Schinke (Eds.), *The Routledge international encyclopedia of sport and exercise psychology: Volume 2: Applied and practical measures* (pp. 263-280). Routledge.

Sadler, G. R., Lee, H. C., Lim, R. S., & Fullerton, J. (2010). Recruitment of hard-to-reach population subgroups via adaptations of the snowball sampling strategy. *Nursing & health sciences*, *12*(3), 369–374. https://doi.org/10.1111/j.1442-2018.2010.00541.x

Steca, P., Baretta, D., Greco, A., D'Addario, M., & Monzani, D. (2018). Associations between personality, sports participation and athletic success. A comparison of Big Five in sporting and non-sporting adults. *Personality and Individual Differences*, *121*, 176-183. https://doi.org/10.1016/j.paid.2017.09.040

Sparks, K. V., Kavussanu, M., Masters, R. S., & Ring, C. (2021). Mindfulness, reinvestment, and rowing under pressure: Evidence for moderated moderation of the anxiety-performance relationship. *Psychology of Sport and Exercise*, 101998. https://doi.org/10.1016/j.psychsport.2021.101998

Spinhoven, P., Huijbers, M. J., Zheng, Y., Ormel, J., & Speckens, A. E. (2017). Mindfulness facets and Big Five personality facets in persons with recurrent depression in remission. *Personality and Individual Differences, 110*, 109-114. https://doi.org/10.1016/j.paid.2017.01.045

Tabachnick, B. G., & Fidell, L. S. (2019). Using multivariate statistics (7th ed.). Boston, MA: *Pearson Education*.

Tang, Y. Y., Hölzel, B. K., & Posner, M. I. (2016). Traits and states in mindfulness meditation. *Nature Reviews Neuroscience, 17*, 59. https://doi.org/10.1038/nrn.2015.7.

Teper, R., & Inzlicht, M. (2014). Mindful acceptance dampens neuroaffective reactions to external and rewarding performance feedback. *Emotion, 14*(1), 105–114. https://doi.org/10.1037/a0034296

Thienot, E., Jackson, B., Dimmock, J., Grove, J. R., Bernier, M., & Fournier, J. F. (2014). Development and preliminary validation of the mindfulness inventory for sport. *Psychology of Sport and Exercise*, *15*(1), 72-80. https://doi.org/10.1016/j.psychsport.2013.10.003

Tucker, R. P., O'Keefe, V. M., Cole, A. B., Rhoades-Kerswill, S., Hollingsworth, D. W., Helle, A. C., DeShong, H. L., Mullins-Sweatt, S. N., & Wingate, L. R. R. (2014). Mindfulness tempers the impact of personality on suicidal ideation. *Personality and Individual Differences*, *68*, 229-233. https://doi.org/10.1016/j.paid.2014.05.001

Watkins M. W. (2017). The reliability of multidimensional neuropsychological measures: from alpha to omega. *The Clinical Neuropsychologist*, *31*(6-7), 1113–1126. https://doi.org/10.1080/13854046.2017.1317364

Wheeler, M. S., Arnkoff, D. B., & Glass, C. R. (2017). The neuroscience of mindfulness: How mindfulness alters the brain and facilitates emotion regulation. *Mindfulness, 8*(6), 1471-1487. https://doi.org/10.1007/s12671-017-0742-x

Zhang, C. Q., Chung, P. K., & Si, G. (2017). Assessing acceptance in mindfulness with direct-worded items: The development and initial validation of the athlete mindfulness questionnaire. *Journal of Sport and Health* Science, 6(3), 311-320. https://doi.org/10.1016/j.jshs.2015.09.0

Table 1

Descriptive Statistics and Pearson Product-moment Correlation Coefficients

Measure	Latent Variable	Individual sport				Team sport				1	2	3	4	5	6	7	8	9
		Female $n = 55$		Male $n = 69$		Female $n = 57$		Male $n = 40$										
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*									
MIS	1. Mindful awareness	4.11	1.07	4.10	1.00	3.79	1.09	4.06	0.92									
	2. Non-judgemental thinking	4.00	0.95	4.08	1.07	3.95	1.12	3.89	1.07	–.186								
	3. Refocusing	3.28	0.91	3.53	0.89	3.19	1.06	3.64	0.99	.419**	–.036							
I-TIPI-R	4. Extraversion	4.17	1.50	4.06	1.33	4.41	1.63	4.59	1.33	.029	–.111	.080						
	5. Agreeableness	5.35	0.95	5.22	1.02	5.26	1.03	5.44	0.86	.135	.012	.112	–.119					
	6. Conscientiousness	5.70	1.16	5.67	1.21	5.77	1.13	5.48	0.95	.268*	.148	.256*	–.050	.065				
	7. Emotional stability	4.09	1.18	4.86	1.33	4.80	1.21	5.00	1.26	.068	.277*	.329*	.045	.192	.125			
	8. Openness to experience	4.56	1.05	4.53	0.97	4.73	0.96	4.64	0.71	.002	–.001	.140	.339*	.039	–.049	.139		
PBS	9. Functional states	3.38	1.08	3.57	0.73	3.35	0.95	3.56	0.92	.370*	–.126	.480**	.119	.147	.215*	.202*	.158	
	10. Dysfunctional states	2.00	1.29	1.86	1.16	1.60	1.30	1.59	1.06	–.044	–.340**	–.189	–.089	.042	–.179	–.325*	–.091	.166

Note. * low correlation, ** moderate correlation (Zhu, 2012); *M* = Mean; *SD* = Standard Deviation

Table 2

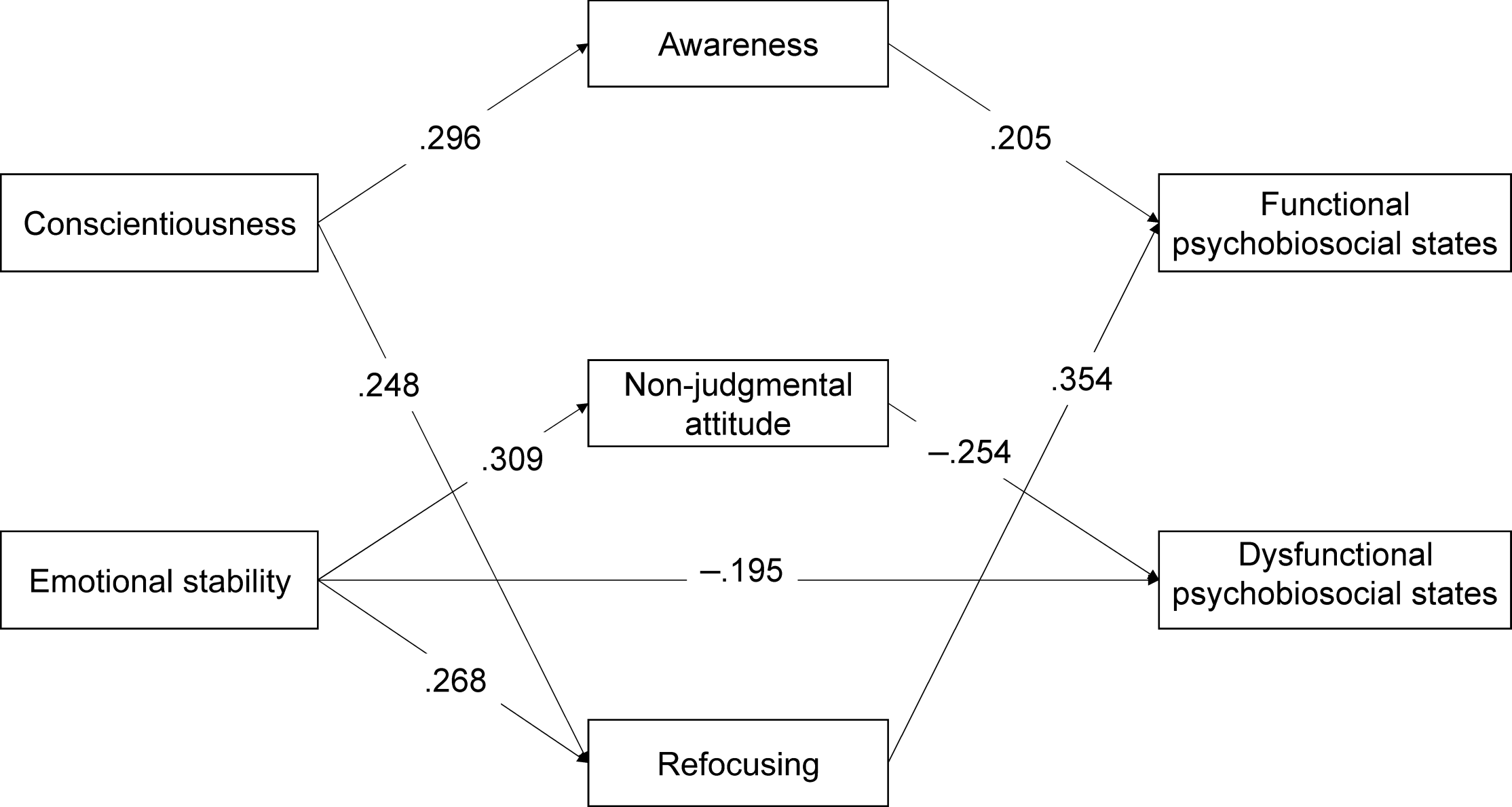
Total, Direct, and Indirect Effects for Paths from Conscientiousness to Functional Psychobiosocial States via Awareness and Refocusing, and from Emotional Stability to Functional Psychobiosocial States via Refocusing, and to Dysfunctional Psychobiosocial States via, Non-judgemental Attitude and Refocusing

Effect	β	SE	Bootstrap Bias-Corrected 95% CI (Lower Upper)	
Conscientiousness to FPBS				
Total	.212*	.065	.080	.336
Total indirect	.148*	.032	.091	.217
Conscientiousness → Awareness → FPBS	.061*	.022	.024	.113
Conscientiousness → Refocusing → FPBS	.088*	.028	.041	.152
Conscientiousness → FPBS	.063	.063	–.059	.185
Emotional Stability to FPBS				
Total	.154*	.066	.028	.286
Total indirect	.095*	.028	.047	.157
Emotional Stability → Refocusing → FPBS	.095*	.028	.047	.157
Emotional Stability → FPBS	.059	.061	–.061	.180
Emotional Stability to DPBS				
Total	–.306*	.061	–.423	–.185
Total indirect	–.111*	.034	–.182	–.051
Emotional Stability → Non-judgmental → DPBS	–.078*	.025	–.135	–.037
Emotional Stability → Refocusing → DPBS	–.032	.022	–.088	.002
Emotional Stability → DPBS	–.195*	.066	–.325	–.063

Note. * Significance indicated via 95% CI. Abbreviations: β = standardized estimate; SE = Standard error; CI = Confidence Interval; FPBS = Functional Psychobiosocial States; DPBS = Dysfunctional Psychobiosocial States.

Figure 1

Path Analysis Results. Significant Standardized Estimates are Presented ($p < .05$)


Awareness
.296
.205
Conscientiousness
Functional psychobiosocial states
.248
Non-judgmental attitude
.354
.309
–.254
Emotional stability
–.195
Dysfunctional psychobiosocial states
.268
Refocusing