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The role of trait mindfulness in shaping the perception of stress, including its role as a moderator or mediator of the effects of personality

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ABSTRACT

Stress reduction techniques, such as mindfulness, have been gaining popularity over the last few decades with research focus shifting toward understanding the factors that contribute to why certain individuals are more likely to benefit from stress reduction techniques compared to others. Mindfulness and personality traits are two factors that have been examined to help explain some of the individual differences in the perception of stress. Thus, the present study aimed to increase our understanding of the relationships between personality traits, mindfulness, and perceived stress. A total of 266 adults (70 % female; age range: 18–64 years; age ($M \pm SD$): 34 ± 13) participated an online survey. A hierarchical multiple regression indicated that 58 % of the variance in perceived stress was explained by personality and mindfulness. Trait mindfulness-attention significantly moderated the relationship between agreeableness and perceived stress. Effect size calculations showed that 57 % of the variation in perceived stress was attributed to neuroticism mediated by mindfulness, attention, and acceptance. Furthermore, 51 % of the variance in perceived stress was attributed to agreeableness mediated by mindfulness (attention and acceptance).

1. Introduction

Over the last three decades, mindfulness-based research has burgeoned substantially, with researchers demonstrating the efficacy of mindfulness as an effective stress reduction approach. Moreover, mindfulness has been consistently linked to a reduction in long-term health implications frequently associated with chronic stress (e.g., Hicks et al., 2020). The mounting number of beneficial health and wellbeing outcomes associated with mindfulness has led to its widespread recommendation as a potential therapeutic intervention for addressing a diverse range of mental and physical health conditions. Mindfulness, however, does not appear to be ‘one-size-fits-all’, with findings indicating that individual differences in personality may influence levels of mindfulness (e.g., Giluk, 2009). A need exists to increase our understanding of the associations between personality and mindfulness, and to determine how these factors impact on stress. Understanding how specific personality characteristics influence an individual’s perception of stress has also been well documented (e.g., Ebstrup et al., 2011; Schneider et al., 2011) and demonstrates that different traits respond differently to stress exposure.

1.1. Mindfulness

Mindfulness is “a state of enhanced attention to, and awareness of, what is taking place in the present” (Walsh et al., 2009, p. 94). Trait mindfulness, or the predisposition to act mindfully can help people to be fully present and aware of their thoughts, emotions, and sensations (Kiken et al., 2015).

Researchers (e.g., Coffey et al., 2010) explain that there are two key elements of mindfulness: mindfulness-acceptance and mindfulness-attention. Ellis et al. (2014) explained that mindfulness-attention related to deliberate regulation of an individual’s experience in the moment, which includes thoughts, feelings, and physical sensations. Mindfulness-acceptance is the open and receptive attitude toward these experiences. Importantly, mindfulness-acceptance does not involve minimizing, ignoring, or judging these experiences, especially the negative or distressing ones, but instead it is giving yourself permission to receive these experiences no matter their affective valence.

1.2. Trait mindfulness and stress

High trait mindfulness is associated with effective stress

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management, as individuals with this quality tend to navigate challenging situations adeptly (Zimmaro et al., 2016). Hicks et al. (2020) extended this investigation by examining connections between trait mindfulness, perceived stress, and skin conductance during exposure to white noise. They suggested that white noise helped maintain participants' present-moment awareness and found that higher trait mindfulness correlated with lower perceived stress and skin conductance, implying reduced stress responses. Similar results were observed in other studies, like Zimmaro et al. (2016), who explored links between trait mindfulness, perceived stress, and physical stress responses in undergraduate students. Participants completed self-report assessments and provided saliva samples for cortisol measurement, revealing that heightened trait mindfulness related to lower perceived stress and cortisol secretion. Although this provides support for the links between trait mindfulness and both perceived and physiological stress responses, it is possible that other variables could be impacting the relationship between trait mindfulness and stress, other variables such as personality could influence this relationship.

Trait mindfulness has been linked with lowered perceived stress being reported. Dillard and Meier (2021) used self-report questionnaires to determine stress and anxiety levels during the COVID-19 pandemic. They examined levels of trait mindfulness using a 12-item mindfulness scale, finding that higher levels of trait mindfulness were linked with lowered levels of perceived stress.

1.3. Trait mindfulness and personality

Higher trait mindfulness can be beneficial in reducing stress responses, but the interplay of personality traits with trait mindfulness introduces additional complexity. Personality traits can influence an individual's level of trait mindfulness, with some personality traits having a positive association to trait mindfulness compared to others (e.g., Hanley & Garland, 2017). Hanley and Garland (2017) further found unique associations between different personality traits and trait-based mindfulness, noting neuroticism was the strongest, negatively correlated, while conscientiousness was the strongest, positively correlated, personality trait linked to dispositional mindfulness. Furthermore, in a meta-analysis of trait mindfulness, the Big Five personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism), intelligence and anxiety, Banfi and Randall (2022) found significant correlations between trait mindfulness and all five personality variables, with the strongest negative effects for neuroticism and trait anxiety, and positive effects for conscientiousness. Banfi and Randall found that the Big Five variables explained 44 % of the variance in trait mindfulness with neuroticism and conscientiousness demonstrating the strongest influence. While some personality traits have strong associations with mindfulness, such as Neuroticism (e.g., Giluk, 2009; Lutzman & Masuda, 2013) and conscientiousness (e.g., Giluk, 2009; Rau & William, 2016), others have displayed mixed results. Extraversion and mindfulness have yielded inconsistent results, with some studies claiming a significant positive relationship (e.g., Hanley & Garland, 2017) while others found no significant relationship (e.g., Rau & William, 2016). Agreeableness and trait mindfulness have not been investigated as often but a positive correlation has been observed (Giluk, 2009), with additional research needed. Theoretically, this positive relationship is expected since agreeable individuals are compliant and tend to live by a "forgive and forget" mentality (Costa & McCrae, 1992), perhaps leading to more non-judgmental attachment toward their inner thoughts. Studies have found conflicting results between openness to experience (i.e., openness) and trait mindfulness. Giluk (2009) found that openness was one of the weakest correlations with trait mindfulness ($r = 0.15$).

1.4. Personality and stress

The Big Five personality traits have been examined extensively in

relation to perceived stress (e.g., Costa & McCrae, 1992; Penley & Tomaka, 2002). Consistently, Neuroticism has shown a positive correlation with perceived stress (Ebstrup et al., 2011), while the other remaining personality traits, openness to experience, agreeableness, conscientiousness, and extraversion have shown mixed results. The relationship between openness and perceived stress is unclear, with some researchers finding negative bivariate correlations (e.g., Penley & Tomaka, 2002), and others finding no significant relationship (e.g., Ebstrup et al., 2011). The interactions between perceived stress, trait mindfulness and personality has not been explored in detail and a more integrated impact of the three variables may be warranted.

1.5. Trait mindfulness, stress, and personality

Trait mindfulness, stress, and personality are three interrelated factors that significantly influence an individual's psychological well-being and coping strategies. Hanley and Garland (2017) suggested that the mindful personality can be desired as emotional stability and conscientious self-regulation, perhaps mindfulness could mediate the relationship between personality traits and perceived stress. Further, Bao et al. (2015) found that trait mindfulness mediated the relationship between the use of emotions and perceived stress, which may support the notion of trait mindfulness as a possible mediating variable with perceived stress.

1.6. Aims and purpose of the study

To date, no study to our knowledge has investigated the mediating and moderating effects of trait mindfulness on the relationship between the Big Five personality traits and perceived stress. Understanding the dynamic interplay between trait mindfulness, personality and stress is crucial for promoting mental well-being and developing effective interventions for stress management.

The current study aims to examine the associations between trait mindfulness and all Big Five personality traits and reconfirm the correlation between trait mindfulness and perceived stress. This paper also aims to investigate if mindfulness-acceptance or mindfulness-attention moderates or mediates the relationship between each of the personality traits and perceived stress. Based on past research (e.g., Hanley & Garland, 2017), it is hypothesised that mindful ness-attention, and mindfulness-acceptance will correlate with all Big Five personality traits and perceived stress.

Exploratory regression, moderation and mediation analyses will be conducted to examine how trait mindfulness-attention and trait mindfulness-acceptance influence the relationship between personality and stress. Three possible models are examined: 1) that personality and mindfulness have independent and direct effects on perceived stress; 2) that the effect of personality on perceived stress is indirect, being mediated through mindfulness; and, 3) that the effect of personality on perceived stress is variable, being moderated by mindfulness. The decision to examine these three possible patterns of association was based on the lack of available theory or evidence to determine which model type is most likely. On the basis of current knowledge, all three models could be possible, therefore this paper will be exploratory.

2. Method

2.1. Participants

Using G*Power (Faul et al., 2009) with a medium effect size (0.05), a power of 0.8, and $\alpha = 0.05$, an estimated minimum of 89 participants were required; a total of 266 adults took part in the current study, which was adequate for the planned analyses. Participants ranged in age from 18 to 64 years of age ($M_{age} = 34.00$, $SD_{age} = 12.68$). Majority of the participants were female (70 %), married/in a cohabiting relationship (54 %), with university education (48 %) and from Australia (97 %). The

majority of participants were employed (64 %) or students (27 %).

2.2. Measures

The variables analysed in this study were measures derived from three instruments: The Big Five Personality Inventory, Perceived Stress Scale, and the Carolina Empirically Derived Mindfulness Inventory.

2.2.1. The Big Five Inventory

The Big Five Inventory (BFI; (John & Srivastava, 1999) is a 44-item personality measure whereby participants answer questions on a 5-point Likert-scale (1 = *Disagree Strongly* to 5 = *Agree Strongly*). Scores are calculated for each Big Five Personality trait: neuroticism (8 items, e.g., *I see myself as someone who worries a lot*; current study $\alpha = 0.84$); extraversion (8 items, e.g., *I see myself as someone who is talkative*; current study $\alpha = 0.87$); agreeableness (9 items, e.g., *I see myself as someone who is helpful and unselfish with others*; current study $\alpha = 0.78$); conscientiousness (9 items, e.g., *I see myself as someone who is a reliable worker*; current study $\alpha = 0.81$); and openness to experience (10 items, e.g., *I see myself as someone who is original, comes up with new ideas*; current study $\alpha = 0.72$). For each of the scales, a mean score is calculated, with all scores ranging from 1.0 to 5.0; higher scores indicating a higher level of that personality trait. In previous studies, the BFI was reported to have good inter-rater reliability with Cronbach's α levels ranging from 0.84 to 0.85 (Hill et al., 2013).

2.2.2. Perceived Stress Scale

The Perceived Stress Scale (PSS; (Cohen et al., 1983) was used to assess the participants' experience of psychosocial stress during the past week. The PSS consists of 10 items (e.g., *In the last week, how often have you felt nervous and stressed?*), to which participants respond on a 5-point Likert-scale (0 = *Never* to 4 = *Very Often*). Total scores ranged from 0 to 40, with higher scores indicating greater perceived stress. The PSS has good reliability, with Cronbach's α of 0.75 and 0.85 for two study groups (Lavoie & Douglas, 2012) and being 0.89 for the current study.

2.2.3. Carolina Empirically Derived Mindfulness Inventory (CEDMI; Coffey et al., 2010)

The CEDMI was used to measure trait mindfulness and consists of 22-items, relating to internal thought patterns, acceptance of thoughts and individual feelings toward thoughts. The CEDMI was chosen to view multiple factors that can contribute to trait mindfulness (acceptance and attention) to help determine which aspects of mindfulness, if any, were more likely to impact the experience of stress. The 22-items were measured on a 5-point Likert-scale (1 = *never or very rarely true* to 5 = *very often or always true*), with a mean score between 1.0 and 5.0 ($M = 3.49$, $SD = 0.60$). The CEDMI also provides participant sub-scale scores of mindfulness-attention and mindfulness-acceptance, which included 8-items and 14-items, respectively. A mean score was calculated ranging from 1.0 to 5.0 for mindfulness-attention (current study, $M = 3.23$, $SD = 0.74$) and mindfulness-acceptance ($M = 3.65$, $SD = 0.91$), with higher scores indicating a higher propensity for that mindfulness sub-scale. The current study showed acceptable reliability for mindfulness-attention (Cronbach $\alpha = 0.84$), consistent with previous studies (Cronbach $\alpha = 0.74$; Ellis et al., 2014) and strong reliability for mindfulness-acceptance ($\alpha = 0.95$), which is consistent with Ellis et al. (2014) reliability analyses ($\alpha = 0.90$).

2.3. Procedure

The University's Human Research Ethics Committee approved this study. Social media (e.g., Facebook), workplace employee emails, and undergraduate psychology classes were used to recruit participants. Advertisements were placed on the University's psychology research noticeboard and students were offered credit toward their research participation requirement if they were currently completing a first-year

psychology course.

Within the recruitment materials, participants were provided with a SurveyMonkey link to the study questionnaires. Before commencing the study, participants were presented with a plain language statement and indicated their informed consent to participate. In total, the study questionnaire took approximately 15–25 min to complete, and the length of the data collection period was six months. Prior to data analysis, the data was reviewed to ensure participants had not completed the questionnaire on more than one occasion. This was completed by comparing IP addresses and demographic information, specifically age and gender.

2.4. Statistical analysis

The dependent variable throughout was perceived stress (PSS scale). A sequence of models was adopted to explore the role of the mindfulness measures alone, the joint role of the mindfulness measures in conjunction with the Big Five personality traits, and the role of the mindfulness measures as moderators or mediators of the effects of personality traits. The moderation and mediation models were limited to the two personality traits that were significant predictors of perceived stress in the joint model. This staged approach reduced the total number of moderation and mediation models from a potential 15 to six, with consequential reduction in the risk of Type 1 errors.

Model 1: Two-stage hierarchical multiple regression analysis was used, with the two mindfulness measures (from CEDMI) included as predictors at stage 1, and the five personality traits (from BFI) added as predictors at Stage 2.

Models 2 and 3: Based on the results of the Model 1 analysis, the two personality traits significantly related to perceived stress in Model 1 together with the two mindfulness measures, were included in the moderation and mediation analyses.

Statistical analyses were performed using SPSS (version 20) and the PROCESS macro (Hayes, 2013).

3. Results

Normality, linearity, and homoscedasticity were confirmed for all variables being used. All data observations were independent of one another, meaning all assumptions were met for the analyses.

3.1. Correlations between personality, mindfulness, and perceived stress

Pearson's bivariate correlational analyses were conducted to investigate associations between key variables (see Table 1). All personality traits had a significant correlation with perceived stress and total mindfulness. Agreeableness and openness were the only personality traits to correlate with mindfulness-attention, while all personality traits significantly correlated with mindfulness-acceptance.

3.2. Multivariate investigation of perceived stress

A 2-step hierarchical multiple regression analysis was used to explore which mindfulness and personality variables would produce a significant correlation with perceived stress. At Step 1, both mindfulness-attention and mindfulness-acceptance were significantly associated with perceived stress ($b = -0.90$, $t = -3.52$, $p < .001$, and $b = -5.30$, $t = -14.78$, $p < .001$, respectively). The total variance explained by the model was 45 %, a moderate effect size (Cohen, 1988). The model was significant $F(2,262) = 122.60$, $p < .001$, $R^2 = 0.49$.

After entering all Big Five personality traits in Step 2, the total variance explained by the model was 58 %, a large effect size (Cohen, 1988), this model was also significant, $F(2,255) = 51.79$, $p < .001$, $R^2 = 0.59$. Neuroticism ($b = 2.73$, $t = 7.38$, $p < .001$) and agreeableness ($b = -1.45$, $t = -2.51$, $p < .05$) were significantly associated with perceived stress, as was trait mindfulness-acceptance but not trait mindfulness-

Table 1
Bivariate correlations between trait mindfulness, stress and the big five personality traits.

	M	SD	1	2	3	4	5	6	7	8	9
1. Total trait mindfulness	3.49	0.60	–								
2. Trait mindfulness-attention	3.20	0.74	0.30**	–							
3. Trait mindfulness-acceptance	3.65	0.91	0.82**	–0.15*	–						
4. Perceived stress	16.78	7.00	–0.69**	–0.00	–0.69**	–					
5. Extraversion	3.22	0.83	0.24**	0.09	0.20**	–0.20**	–				
6. Agreeableness	3.83	0.61	0.30**	0.15*	0.24**	–0.35**	0.08	–			
7. Conscientiousness	3.75	0.66	0.34**	0.11	0.32**	–0.31**	0.26**	0.33**	–		
8. Neuroticism	2.95	0.82	–0.66**	0.01	–0.69**	0.69**	–0.28**	–0.34**	–0.29**	–	
9. Openness to experience	3.47	0.55	0.31**	0.42**	0.12*	–0.21**	0.27**	0.15*	0.25**	–0.20**	–

* $p < .05$.

** $p < .01$.

attention ($b = -0.15, t = -1.21, p < .001$, and $b = -3.13, t = -6.16, p = .08$, respectively), with change $\Delta R^2 = 0.09, p < .001$.

3.3. Moderation

Neuroticism and agreeableness were chosen after initial analysis indicated they were the traits with the strongest reported associations with perceived stress following our regression. In total, four moderation analyses were conducted to investigate if either mindfulness-attention or mindfulness-acceptance moderated the relationship between neuroticism and perceived stress, or agreeableness and perceived stress.

Hayes’ (2013) PROCESS macro was used to determine if mindfulness-attention moderated the relationship between neuroticism and perceived stress. The model as a whole was significant, $F(3262) = 82.95, p < .001, R^2 = 0.49$. However, mindfulness-attention did not significantly moderate the relationship between neuroticism and perceived stress, $b = 0.89, t(262) = 1.77, p = .08$.

The second moderation analysis determined if mindfulness-acceptance would moderate the relationship between neuroticism and perceived stress. The model, as a whole, was significant, $F(3262) = 21.54, p < .001, R^2 = 0.56$. However, mindfulness-acceptance did not significantly moderate the relationship between neuroticism and perceived stress, $b = -0.20, t(262) = -0.55, p = .58$.

The third moderation analysis ascertained if mindfulness-attention would moderate the relationship between agreeableness and perceived stress. The model, as a whole, was significant, $F(3262) = 15.37, p < .001, R^2 = 0.15$. Mindfulness-attention significantly moderated the relationship between agreeableness and perceived stress, $b = -2.00, t(262) = -2.75, p < .05$. The conditional effect of agreeableness on perceived stress showed corresponding results. At low, moderate, and high levels of mindfulness attention, a significant relationship between agreeableness and perceived stress occurred, $b = -2.78, t(262) = -3.61, p < .05, b = -4.27, t(262) = -5.82, p < .001$, and $b = -5.75, t(262) = -5.64, p < .001$, respectively.

The final moderation analysis determined if mindfulness-acceptance would moderate the relationship between agreeableness and perceived stress. The model, as a whole, was significant, $F(3262) = 24.34, p < .001, R^2 = 0.51$. Mindfulness-acceptance did not significantly moderate the relationship between agreeableness and perceived stress, $b = 0.08, t(262) = 0.16, p = .87$.

3.4. Mediation

Mediation analyses were conducted to examine the effect of total trait mindfulness on the relationship between personality traits and perceived stress; separate mediation analyses were also conducted for neuroticism and agreeableness. Following the revisions by Hayes (2009) to the Baron and Kenny (1986) recommendations, the mediation model for each personality trait involved fitting four regression models: (i) perceived stress was predicted by the personality trait alone (a single-predictor model); (ii) each trait mindfulness variable was predicted by

the personality trait (two single-predictor models); (iii) perceived stress was predicted by the trait mindfulness variables and the personality trait (a three-predictor model). To determine mediation, the personality trait must influence the trait mindfulness variable, which in turn must influence perceived stress, and the signs of the relationships must be in the expected direction. Furthermore, the effect of the personality trait on perceived stress must be significantly changed in the model including total trait mindfulness, compared with a one-predictor model with personality trait alone. This final criterion is not tested directly; rather, it is equivalent to the product of the regression coefficients of the two segments of the mediation path being significantly different from zero. Because of non-normality caused by the multiplicative process, this test of significance requires bootstrap methods, and the result is expressed as a confidence interval, with significance represented by non-inclusion of zero in the confidence interval.

Neuroticism was a significant predictor of perceived stress ($b = 5.89, t = 15.64, p < .001$) and a significant predictor of mindfulness-acceptance ($t = -15.48$), but not mindfulness-attention ($t = 0.23$). As seen in Fig. 1, in the three-predictor model mindfulness-attention was not a significant predictor of perceived stress ($t = -1.67$) but mindfulness-acceptance was ($t = -7.28$). The magnitude of the influence of mindfulness was significant ($t = 7.22$). Using bias-corrected and accelerated bootstrapping (Preacher & Hayes, 2008), the reduction in the association between neuroticism and perceived stress was found to be significantly attributed to mindfulness-acceptance but not mindfulness-attention (95 % confidence intervals for indirect affects: mindfulness-acceptance [1.65, 3.21], mindfulness-attention [-0.12, 0.07], 1000 replications). Effect size was calculated using the R^2 values, 57 % of the variation in perceived stress was attributed to neuroticism mediated by mindfulness (attention and acceptance).

Agreeableness significantly predicted perceived stress ($b = -4.01, t = -6.01, p < .001$) and was also a significant predictor of mindfulness-attention ($t = 2.53$) and mindfulness-acceptance ($t = 4.05$). As displayed in Fig. 2, in the three-predictor model mindfulness-attention was not a significant predictor of perceived stress ($t = -1.57$) but mindfulness-acceptance was ($t = -14.42$). The magnitude of the influence of

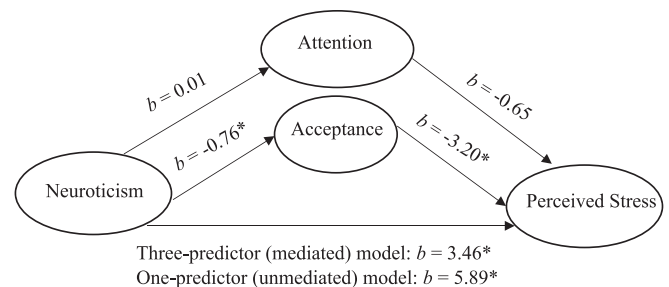


Fig. 1. Mediation model – mindfulness as a mediator between neuroticism and perceived stress.
Note. * $p < .001$.

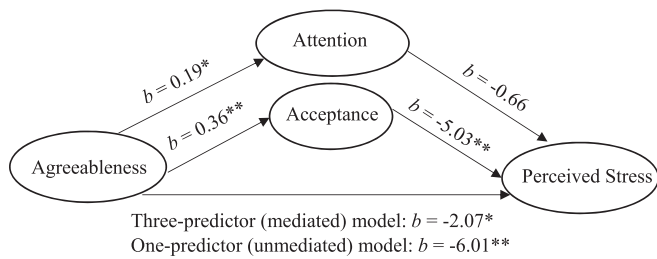


Fig. 2. Mediation model – mindfulness as a mediator between agreeableness and perceived stress.

Note. * $p < .05$; ** $p < .001$.

mindfulness was significant ($t = -3.99$). Using bias-corrected and accelerated bootstrapping (Preacher & Hayes, 2008), the reduction in the association between agreeableness and perceived stress was found to be significantly attributed to mindfulness-acceptance but not mindfulness-attention (95 % confidence intervals for indirect affects: mindfulness-acceptance $[-2.78, -0.90]$, mindfulness-attention $[-0.40, 0.01]$, 1000 replications). Effect size was calculated using the R^2 values, 51 % of the variation in perceived stress was attributed to agreeableness mediated by mindfulness (attention and acceptance).

4. Discussion

This study aimed to further examine the associations between trait mindfulness and the Big Five personality traits and reconfirm the relationship between trait mindfulness and perceived stress. It also aimed to determine if trait mindfulness would mediate or moderate the relationship between personality and perceived stress.

The hypothesis that, mindfulness-attention and mindfulness-acceptance would be correlated with all the Big Five personality traits and perceived stress was partially supported. While mindfulness-acceptance had strong (Cohen, 1988) negative correlations with perceived stress, mindfulness-attention did not significantly correlate with perceived stress. Our results support Zimmaro et al.'s (2016) results who found a strong negative correlation between total trait mindfulness and perceived stress. Our correlational analysis also indicated that paying attention to thoughts was not likely to impact perceived stress, but acceptance of these thoughts matters between trait mindfulness and perceived stress, extending findings of existing research. Consistent with other studies (e.g., Giluk, 2009), individual differences in trait mindfulness and Big Five personality traits were also found.

The correlation analysis mindfulness-attention was the only variable not correlated with perceived stress, which indicates that paying attention to thoughts does not influence the perception of stress. The lack of a significant correlation between mindfulness-attention and neuroticism could explain why individuals high in neuroticism experience more anxiety (Carver & Connor-Smith, 2010) and tend to be more impulsive (Costa & McCrae, 1992), possibly because they do not take the time to focus on their thoughts. The strong association between openness and mindfulness-attention combined with the weak link between openness and perceived stress, mindfulness-attention and perceived stress may indicate that mindfulness plays a mediating role in the relationship between personality and perceived stress.

The regression analysis indicated that agreeableness and neuroticism were the only personality traits to explain significant unique proportions of the variance in perceived stress when all five personality traits were viewed concurrently. When mindfulness-acceptance and mindfulness-attention were added, both agreeableness and neuroticism still made significant contributions to the explanation of variance in perceived stress. While the unique contribution of neuroticism on perceived stress decreased, the unique contribution of agreeableness remained the same, which indicates that mindfulness does not seem to impact levels of perceived stress for individuals high in agreeableness. This result has not

been observed in other studies.

The relationship between neuroticism and perceived stress was not moderated by either mindfulness-attention or mindfulness-acceptance. While, both models were significant, neither mindfulness-attention nor mindfulness-acceptance contributed to significant variance in the relationship between neuroticism or perceived stress. Increasing levels of trait mindfulness may not be enough to reduce the perception of stress for those individuals high in neuroticism, despite previous research that has shown mindfulness interventions to be effective forms of coping with stress (e.g., Baer et al., 2012).

Mindfulness-attention significantly moderated the relationship between agreeableness and perceived stress, which indicates that the relationship between agreeableness and perceived stress is dependent on levels of mindfulness-attention. Uniquely, this study found that individuals high in agreeableness and mindfulness-attention would be less likely to report perceived stress; this could help shape targeted stress reduction strategies. Mindfulness-acceptance, did not moderate the relationship between agreeableness and perceived stress, indicating that for those high in agreeableness paying attention to inner thoughts is more important than accepting them.

The possibility of mindfulness-attention or mindfulness-acceptance mediating the relationship between personality and perceived stress was yet to be explored, though could help to further explain the conflicting results between personality traits and perceived stress (e.g., Ebstrup et al., 2011). While no full mediation was found, trait mindfulness-acceptance partially mediated the relationship between neuroticism or perceived stress, while mindfulness-attention did not have any significant mediation effect. Thus, individuals high in neuroticism are more likely to pay attention to their thoughts but less likely to be accepting of them; mindfulness strategies for those high in neuroticism should focus on teaching acceptance rather than attention to help reduce stress responses.

The relationship between agreeableness and perceived stress showed partial mediation. Partial mediation was found between trait mindfulness-acceptance, but not mindfulness-attention. However, given that mindfulness-attention was shown to moderate the relationship between agreeableness and perceived stress, this is unsurprising since the relationship between agreeableness and perceived stress was reliant on mindfulness-attention. Mindfulness-acceptance partially mediated the relationship between agreeableness and perceived stress, thus, stress reduction techniques that increase levels of acceptance could be beneficial to help reduce perceived stress, to our knowledge these results have not been found by other researchers.

4.1. Limitations and future directions

These findings must be considered based on the study limitations. Participants were mostly from a university setting, which may have led to mainly individuals with higher education and employment, which makes it more difficult to generalise the results to a more diverse educational population.

Future research could aim to replicate these results with a wider population sample, including a more culturally diverse sample, which could allow for better generalisability. Future research could also examine the impact of state-based mindfulness interventions on the relationship between perceived stress and personality. This could help guide mindfulness-based stress reduction programs and ensure that they are being used with individuals who will benefit most from them.

5. Conclusion

The current study contributes to the existing literature because it brings personality, trait mindfulness, and perceived stress together and examines the ways trait mindfulness may be influencing the relationship between personality and stress. The results indicate that mindfulness-based interventions aimed at reducing perceived stress should focus

more on teaching acceptance of, rather than attention to, thoughts, especially when targeting people who score highly in neuroticism.

CRedit authorship contribution statement

Leanne Duggan: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Writing – original draft, Writing – review & editing. **Jack Harvey:** Data curation, Supervision, Writing – original draft, Writing – review & editing. **Kerrin Ford:** Writing – original draft, Writing – review & editing. **Christopher Mesagno:** Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing.

Data availability

The data that has been used is confidential.

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