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Perceived Psychological Stress and Trait Mindfulness Among First-Year Doctor of Physical Therapy Students

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Abstract
Stress is an increasing problem that can have negative consequences for healthcare students and professionals. The demanding expectations of health professionals begin even before they enter the healthcare workforce. Health professional students are susceptible to stress in their didactic and clinical education due to high academic workloads and performance demands. The research problem addressed in this study is the high stress levels of Doctor of Physical Therapy (DPT) students. Previous research demonstrates that first-year DPT students experience high stress levels and may be unable to manage them effectively. Prolonged exposure to high stress levels can negatively affect students 'physical and mental health, and academic performance, thereby leading to burnout. Protection against stress can come from trait mindfulness, one's inherent tendency to be mindful, which has been previously linked to nonreactivity and flexible responses to stimuli. The purpose of the study was to investigate the relationship between five facets of trait mindfulness and perceived psychological stress among first year DPT students. The study adopted a quantitative methodology and a correlational research design to examine these relationships. Data were collected using two validated self-report survey instruments: the Five Factor Mindfulness Questionnaire (FFMQ) and the Perceived Stress Scale (PSS-10). Multiple linear regression analysis indicated that Nonjudging of Inner Experience (p=.003) facet of trait mindfulness was the strongest predictor of students' perceived psychological stress. Physical therapy programs should use the findings from this foundational study to introduce tailored mindfulness interventions and practice into the DPT curriculum. Improving students 'coping strategies for managing stress would better prepare them for their future roles as healthcare professionals.
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1. Introduction

Health professional students, including Doctor of Physical Therapy (DPT) students, are susceptible to stress in their didactic and clinical education due to high academic workloads and performance demands (Afridi & Fahim, 2019; Frank & Cassady, 2005; Frazer & Echternach, 1991; Hodselmans et al., 2018; Jacob et al., 2012; Jacob et al., 2013; Williams et al., 2018). In previous studies, DPT students reported higher stress levels when compared to their non-healthcare age- and gender-matched peers (Bogardus et al., 2021; Frank & Cassady, 2005). Chronic unmanaged stress can adversely affect students 'learning, clinical performance, physical health, and psychological wellbeing (McConville et al., 2017). Adverse effects of prolonged exposure to stress contribute to burnout (Maslach & Leiter, 2016). Maslach and Leiter (2016) described burnout as a group of psychological symptoms that surface in response to prolonged exposure to interpersonal stressors. The likelihood of burnout increases when students perceive they cannot cope adequately with stressors (Brooke et al., 2020). Graduate students unable to cope with stress during their education may be unable to manage work-related demands and stress in the professional healthcare environment, which may lead to burnout. Burnout in health professionals has been previously reported to affect patient care and safety negatively (Cimiotti et al., 2012; Dall'Ora et al., 2020; Liu & Aungsuroch, 2018; Nantsupawat et al., 2016; Reith, 2018; Shanafelt et al., 2010; Welp et al., 2014; Zarei et al., 2016). Therefore, DPT students need positive strategies to cope with stress effectively.

Students who can effectively manage stress throughout their education and training should be better able to

manage job-related stress once they graduate and enter a demanding healthcare workforce. One approach to effective stress management is mindfulness, a popular meditation technique. Findings from empirical research suggest the benefits of mindfulness training on psychological stress levels of health professional students (Aherne et al., 2016; Marthiensen et al., 2019; McConville et al., 2017; O'Driscoll et al., 2017; Spadaro & Hunker, 2016). This body of literature includes studies specific to DPT students (Chambers et al., 2016; Dean et al., 2017; Gutman et al., 2020; Kindel & Rafoth, 2020; McConville et al., 2017; McConville et al., 2019). Mindfulness is a simple concept that refers to an individual intentionally and nonjudgmentally bringing their awareness to their present experience. Kabat-Zinn's (1994) working definition of mindfulness is "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally" (p. 4). As mindfulness practice in healthcare education continues to expand, it is crucial to discern how different mindfulness traits are connected to reduced perceived psychological stress. This knowledge can be used by physical therapy programs to assist students with stress management and coping challenges, which may better prepare students for their future roles as healthcare professionals.

2. Purpose

The problem addressed by this study is the high stress levels of DPT students and their inability to manage them effectively. The purpose of this quantitative correlational research study was to examine the relationship between five facets of trait mindfulness and perceived psychological stress among first year DPT students. Specifically, this study addressed the following research questions:

1. Is there a significant relationship between the Observing facet of trait mindfulness and perceived psychological stress among first year DPT students?
2. Is there a significant relationship between the Describing facet of trait mindfulness and perceived psychological stress among first year DPT students?
3. Is there a significant relationship between the Acting with Awareness facet of trait mindfulness and perceived psychological stress among first year DPT students?
4. Is there a significant relationship between the Nonjudging of Inner Experience facet of trait mindfulness and perceived psychological stress among first year DPT students?
5. Is there a significant relationship between the Nonreactivity to Inner Experience facet of trait mindfulness and perceived psychological stress among first year DPT students?
6. Is there a significant relationship between overall trait mindfulness and perceived psychological stress among first year DPT students?

Primary data were collected using two validated survey instruments: the Five Facet Mindfulness Questionnaire, or FFMQ (Baer et al., 2006), and the 10-item Perceived Stress Scale, or PSS-10 (Cohen et al., 1983; Cohen & Williamson, 1988).

3. Literature

3.1 Stress in Physical Therapy Students

Evidence of high stress levels in physical therapy students was reported in the early 1990s and has continued to the present (Afridi & Fahim, 2019; Bogardus et al., 2021; Frank & Cassady, 2005; Frazer & Echternach,1991; Hodselmans et al., 2018; Jacob et al., 2012;2013; O'Meara et al., 1994; Williams et al., 2018). The earliest studies published in the *Journal of Physical Therapy Education* indicated that physical therapy students experienced a relatively high degree of stress (Frazer & Echternach, 1991; O'Meara et al., 1994). The most significant sources of stress reported were due to academic loads, such as note-taking, examinations, fast-paced lectures, and homework load (Frazer & Echternach, 1991).

Although these previous investigations supported the increased stress levels experienced by physical therapy students, these studies were conducted in bachelor's and master's degree programs. A shift to an entry-level doctoral degree for practicing physical therapists began in 1996 (Williams et al., 2018). The progressive adoption of the doctoral degree has significantly raised the academic standards and program requirements for entry level-preparedness (Plack & Wong, 2002; Williams et al., 2018). Therefore, the results of these early studies cannot necessarily be generalized to the current population of DPT students.

Frank and Cassady (2005) investigated DPT students' perceived stress and anxiety. The results indicated that mean scores on the Perceived Stress Scale (PSS-14), the Trait Anxiety Scale, and the State Anxiety Scale were higher for participants than for age-matched adults. In addition, scores in all three measures were higher in female students than in males. Similarly, a recent large national mixed-methods study by Bogardus et al. (2021) also found that DPT students had higher stress, anxiety, and depression levels, as measured by the Depression, Anxiety, and Stress Scale (DASS-42), compared to normative data for aged-matched peers. The researchers also identified differences in DASS-42 mean scores between students in separate years of study. First-year students had significantly higher stress levels than second- or third-year students. They also had higher levels of anxiety and depression than students who were in their third year.

Physical therapy students encounter various sources of stress in a doctorate level program. According to Van Veld et al. (2018), common sources of stress include balancing school with life and personal responsibilities, skill performance, examinations and grades, and workload (primarily associated with the quantity and quality of new information that must be acquired). Previous research findings indicated academic stress and course workload to be the leading causes of stress among both undergraduate and graduate physical therapy students (Brooke et al., 2020; Daisuke & Ayumi, 2016; Frazer & Echternach, 1991; Jacob et al., 2012; Jacob & Einstein, 2017; Tucker et al., 2006; Van Veld et al., 2018). This study addressed the stress experience of first year DPT students within the first few weeks of their first term.

3.2 Coping with Stress

The transactional theory of stress and coping, developed by Lazarus and Folkman (1984) describes coping as "constantly changing cognitive and behavioral efforts to manage specific external and or internal demands that are appraised as taxing or exceeding the resources of the person" (p. 141). A person will employ coping measures when, through the appraisal process, they have deemed a situation to be stressful. They then engage in coping efforts in response to that stress. The transactional conceptualization of coping is process-oriented rather than trait oriented; therefore, it reflects a person's thoughts and actions, which change as events unfold.

3.2.1 Coping in DPT Students

Few studies have investigated how DPT students cope with elevated stress (Brooke et al., 2020; Van Veld et al., 2018; Williams et al., 2018). The seminal work of Van Veld et al. (2018) explored students 'perceived coping abilities during their first year of a DPT program. The results revealed statistically significant increases in The Coping Self-Efficacy Scale (CSE) scores over each trimester, which indicated improvements in self-efficacy related to their ability to cope with typical stressors experienced by DPT students during the first year. Although the authors reported that most DPT students improved their coping strategies without intervention, they also suggested implementing planned intervention during the first year to students 'self-efficacy (Van Veld, 2018).

A more recent study by Brooke et al. (2020) investigated DPT students 'coping strategies at three different times during their first year. In contrast to the Van Veld et al. (2020) findings, the Brooke et al. (2020) results revealed no significant changes in CSE scores over time. However, the findings did indicate that students used adaptive and maladaptive coping strategies throughout all three points in time. Adaptive strategies students reported included attracting social support, studying with friends, engaging in physical and recreational activities, participating in mindfulness or positive inner monologue, engaging in religious or spiritual activities, and receiving psychological intervention. Maladaptive coping behaviors reported were overindulgent drinking, eating, and gaming.

The literature examining DPT students' strategies to cope with stress is scarce. However, common themes from the available studies indicate that some students engage in maladaptive coping behaviors in response to the stress they experience throughout their first year. Interventions directed at developing and reinforcing adaptive coping strategies early in the DPT program may assist students who are unable to manage stress positively.

3.3 Mindfulness

3.3.1 History

Mindfulness originated in Buddhist philosophy but is not exclusively associated with religious practice (Willgens et al., 2016). Mindfulness practice is grounded on the work of Kabat-Zinn (1994), who defined mindfulness as "paying attention in a particular way: on purpose, in the present moment, and non-judgmentally" (p.4). In contrast to transcendental meditation, which teaches mantras, chanting, and imagery to promote relaxed awareness (Ott, 2004), mindfulness meditation teaches stillness while focusing on one's breath to gain present awareness (Smith, 2014).

3.3.2 Benefits of Mindfulness Practice

Evidence shows that mindfulness has many physiological benefits and positive effects on psychological health and wellbeing. Psychological benefits of mindfulness include decreased stress (Kindel & Rafoth, 2020; Yang et al., 2018), decreased anxiety and depression (Braden et al., 2016; Lenz et al., 2016), and improvement in coping strategies and emotional health (Willgens et al., 2016). Further, mindfulness has also been shown to decrease anxiety associated with academic evaluation and to improve critical thinking (Dundas et al., 2016; Noone et al., 2015). Finally, the benefits of mindfulness have been increased through participation in training and practice (Aherne et al., 2016; de Vibe et al., 2018; Kindel & Rafoth, 2020; Taren et al., 2015).

3.3.3 Mindfulness in Stress and Coping

Lazarus and Folkman (1984) described the process of reappraisal as the use of new information to adjust an individual's previous appraisal. Building on this concept, in their "mindfulness-to-meaning theory," Garland et al. (2015) proposed the importance of mindfulness in the process of positive reappraisal to enhance wellbeing. According to this theory, mindfulness practice alters how an individual perceives an experience (Garland et al.,

2015). This alteration promotes positive reappraisals and emotions, which support adaptative behaviors. Further, mindfulness requires expanding the breadth of appraisal to "appreciate that even aversive experiences are potential vehicles for personal transformation and growth" (Garland et al., 2015, p. 4). Therefore, positive reappraisals achieved during mindfulness practice regulate adverse experiences by providing meaning that impedes or hinders maladaptive cognitive patterns and behaviors.

3.3.4 Trait Mindfulness and Psychological Stress

Although research on the benefits of mindfulness training on physiological and psychological health continues to grow, limited studies have examined the associations between the different facets of trait mindfulness and perceived psychological stress. To better understand these relationships, Bodenlos et al. (2015) conducted examined the correlation between the five facets of trait mindfulness and perceived psychological stress in undergraduate students in a college in the Northeastern United States. These researchers used the FFMQ and the PSS as outcome measures. They identified a statistically significant negative correlation between students ' perceived psychological stress and all five facets of trait mindfulness. Another study, conducted by Harnett et al. (2016), also found significant negative associations between all of the facets of trait mindfulness except Observing and perceived psychological stress in a large sample of 452 participants consisting of undergraduate students and community members. A more recent study by Ede et al. (2020) reported similar results. In a sample of 99 young adults aged 18 to 25 years old, two facets of trait mindfulness (Acting with Awareness and Nonjudgement) were associated with lower levels of perceived stress, and the Observe facet was only associated with less stress when nonreactivity to inner experience scores were higher. Although previous studies have shed light on the relationships between the different facets of trait mindfulness and perceived psychological stress, there remains a gap in the available literature surrounding these relationships, specifically the influence of all five facets on individual perceived psychological stress. This was the first study to investigate these relationships with DPT students.

3.3.5 Mindfulness in Physical Therapy Education

A limited number of studies have been conducted on mindfulness and meditation in physical therapy education (Chambers et al., 2016; Dean et al., 2017; Kindel & Rafoth, 2020; Willgens & Sharf, 2015; Willgens & Hummel, 2016; Willgens et al., 2016). Willgens et al. (2016) conducted a qualitative study exploring PTs 'perceptions of mindfulness and its practice for reducing stress. The results supported the efficacy of mindfulness practice to enhance PTs 'self-care practices. The authors noted that introducing mindfulness early in DPT education with regular practice to reduce student stress would be ideal.

Kindel and Rafoth (2020) conducted a more recent randomized control trial investigating the effects of teaching a mindfulness curriculum on perceived stress and mindfulness scores in DPT students. The findings indicated statistically significant improvements in perceived stress and mindfulness. Although students only maintained improvements in stress at the 8-week follow-up, the study contributed to the limited literature on mindfulness in DPT education.

4. Methodology

An explanatory correlational research design was appropriate to investigate the relationship between the five facets of trait mindfulness and perceived psychological stress.

4.1 Population and Sample

The population for this study consisted of first term DPT students within their first year of study from four DPT programs at a private university with five campuses in three states. A nonprobability convenience sampling method was used to recruit participants (Creswell & Guetterman, 2019). The inclusion criteria were that students had to be in the first term of their first year of study at one of the four DPT programs. Participants not enrolled in physical therapy programs or not in the first term of their first year of study at one of the four DPT programs were excluded.

4.2 Instrumentation

This study collected primary data by combining two validated questionnaires: the Five Facet Mindfulness Questionnaire (FFMQ) and the PSS-10. Baer et al. (2006) derived the FFMQ's five-facet structure through a factor analysis of other mindfulness questionnaires used to measure the trait-like tendency to be mindful in daily interactions. It is a 39-item scale, which addressed the research questions in this study by measuring five facets of trait mindfulness, including Observing, Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience. According to Baer et al. (2006), the FFMQ has been shown to have good internal consistency, with the following Cronbach alphas for the five facets: 0.75 (Nonreactivity to Inner Experience), 0.83 (Observing), 0.87 (Acting with Awareness), 0.87 (Nonjudging of Inner Experience), and 0.91 (Describing).

Cohen et al. (1983) and Cohen and Williamson (1988) created the PSS-10. This simple 10-item scale captured participants' overall stress rating by measuring the degree to which they appraised their experiences over the past month as stressful. The PSS-10 has been shown to have good internal consistency in adult and university student populations, adequate test-retest reliability in adults, and construct validity (Lee, 2012). The Cronbach alpha for the PSS-10 was 0.89.

4.3 Data Collection

Primary data were collected from 48 students during their first term of their first year of study using an online questionnaire developed using Survey Monkey. The online questionnaire included a request for demographic information, such as age, perceived gender, and employment status, along with the measures for trait mindfulness (FFMQ by Baer et al., 2006) and perceived stress (the PSS-10 by Cohen et al., 1983; Cohen & Williamson, 1988).

5. Analysis of Data

5.1 Validity and Reliability of Data

Within the inferential analysis presented, all test assumptions related to parametric testing were examined and revealed no significant problems, including normality, linearity, multicollinearity, and homoskedasticity. To address the potential undue influence of outlier scores, three high outliers were treated for the overall trait mindfulness scale score and reduced to the next value that was not an outlier. Regarding the trait mindfulness subscales, the Describing subscale evidenced two high outliers that were treated and reduced to the next score that was not an outlier. The Awareness subscale had two high outliers that were also treated and reduced to the next score that was not an outlier. Similarly, the Nonjudgement inner subscale had one high outlier that was treated and reduced to the next score that was not an outlier. Finally, the Nonreactivity to Inner Experience had one high outlier that was treated and reduced to the next score that was not an outlier.

There were 16 respondents who began to complete the study survey but did not provide any data regarding the stress or mindfulness scales and were excluded from the study. Among the 48 respondents included in the study, there were a small number of missing data values that were nonetheless treated for analysis. There were missing data values for two items (among two study participants) within the PSS. The mean score for each item was substituted for the two missing values. In addition, one study participant did not report their age. The average age of the sample was used for the single missing age value.

5.2 Descriptive Statistics

Demographic information was collected from all 48 participants in the study. Table 1 presents a descriptive analysis of the study participants' categorical and demographic characteristics. (see Table 1) The additional demographic information collected included the study participants' age, perceived psychological stress, and trait mindfulness score. Data indicated that the average study participant was 24.21 years old (SD=2.40). The mean scores for the independent and dependent variables were 19.73 (SD=5.28) for the perceived psychological stress total scale, 121.83 (SD=13.34) for the trait mindfulness total scale, 26.19 (SD=5.17) for the trait mindfulness Observing subscale, 25.73 (SD=4.42) for the trait mindfulness Describing subscale, 23.44 (SD=4.63) for the trait mindfulness Acting with Awareness subscale, 25.10 (SD=5.57) for the trait mindfulness Nonjudging of Inner Experience subscale, and 21.85 (SD=3.22) for the trait mindfulness Nonreactivity to Inner Experience subscale. The distribution of all the trait mindfulness and perceived psychological stress scores were approximately normal, as the skewness and kurtosis were less than two times the standard error of each value. Table 2 presents a descriptive analysis of the continuous study variables, including study participant age, perceived psychological stress, and trait mindfulness. (see Table 2)

5.3 Data Analysis

5.3.1 Bivariate Analysis Results

The 2-tailed correlation results indicated that perceived psychological stress total scores were not related at a statistically significant level to the trait mindfulness Observing subscale scores, $r(46)= -.23$, $p=.11$, mindfulness Describing subscale scores, $r(46)=.19$, $p=.21$, or study participant age, $r(46)= -.02$, $p=.92$. However, the bivariate analysis did indicate that lower perceived psychological stress scores were significantly related to higher scores in the total trait mindfulness scale, $r(46)= -.54$, $p<.01$, mindfulness Acting with Awareness subscale, $r(46)= -.33$, $p<.05$, mindfulness Nonjudging of Inner Experience subscale, $r(46)= -.58$, $p<.01$, and mindfulness Nonreactivity to Inner Experience subscale, $r(46)= -.49$, $p<.01$. Table 3 presents the results of a Pearson's r correlation analysis examining the relationship between age, perceived psychological stress, and trait mindfulness scores. (see Table 3)

Dichotomous predictor variables were related to the continuous dependent variable (perceived psychological stress) via independent samples t-test analysis. In addition, predictor variables with three or more

categories were related to the continuous dependent variable (perceived psychological stress) via one-way ANOVA analysis. Results indicated that total perceived psychological stress scores did not vary at a statistically significant level by gender, $t(45)= -1.16$, $p=.13$, racial/ethnic identity, $F(3, 44)=1.11$, $p=.36$, or marital status, $F(2, 45)=1.76$, $p=.18$. Table 4 presents the results of independent-samples t-test analysis and one-way-ANOVA analysis of total perceived psychological stress scores by demographic characteristics. (see Table 4)

5.3.2 Multivariate Analysis Results

A multiple linear regression analysis was used to model the effect of the subscales reflecting the subdimensions of trait mindfulness (Observing, Describing, Acting with Awareness, Nonjudging of Inner Experience, Nonreactivity to Inner Experience) upon the dependent variable (perceived psychological stress). The goal of this multivariate analysis was to examine the relationships between the multiple trait mindfulness subscales and the dependent variable to determine which scale had the strongest effect on perceived psychological stress.

Analysis indicated that the overall model was statistically significant, $F(3, 44)=10.69$, $p<.001$, and explained 42% ($R^2=.42$, adjusted $R^2=.38$) of the variance in the dependent variable. Regarding the individual predictors, the trait mindfulness Acting with Awareness subscale, B=−.19, SE=.14, β=−.16, $p=.18$, and the trait mindfulness Nonreactivity to Inner Experience subscale, B=−.43, SE=.21, β=−.26, $p=.051$, were not significantly related to the dependent variable. However, higher scores reflecting the trait mindfulness Nonjudging of Inner Experience subscale, B=−.40, SE=.12, $p<.01$ were related to lower total perceived psychological stress scores at the multivariate level. Table 5 presents the multiple linear regression analysis examining the relationship of total PSS scores with trait mindfulness subscale scores. (see Table 5)

6. Evaluation of Findings

6.1 Research Question One: Observing and Perceived Stress

The first research question asked if there was a significant relationship between the Observing dimension of trait mindfulness and perceived psychological stress among first year DPT students. Table 3 presents data indicating that at the bivariate level Observing subscale scores were not significantly related to total perceived psychological stress scores, $r(46)=-.23$, $p=.11$. It appears that there was not a significant relationship among first year DPT students in the areas of Observing and perceived psychological stress. Although the Observing trait mindfulness subscale did not show a significant correlation with total perceived psychological stress scores, it did show a positive inter-correlation with the Describing subscale, $r(46)=.33$, $p<.05$. This result suggests that students who demonstrated an awareness of their internal and external experiences also demonstrated an ability to describe them. The Observing mindfulness subscale also had the highest mean score (26.91) compared to the other four mindfulness subscales, suggesting that students in this sample demonstrated greater inherent ability to Observe than to demonstrate Describing, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience.

6.2 Research Question Two: Describing and Perceived Stress

The second research question asked if there was a significant relationship between the Describing dimension of trait mindfulness and perceived psychological stress among first-year DPT students. Table 3 presents data indicating that at the bivariate level Describing subscale scores were not significantly related to total perceived psychological stress scores, $r(46)=-.19$, $p=.21$. Although the Describing subscale did not demonstrate a significant relationship with total perceived psychological stress scores, it did show significant positive intercorrelations with the Acting with Awareness subscale, $r(46)=.42$. $p<.0$, and the Nonreactivity to Inner Experience subscale, $r(46)=.37$, $p<.01$, both of which had significant negative correlations with total perceived psychological stress scores at the bivariate level. Further, although Nonreactivity to Inner Experience was not statistically significantly related to total stress scores at the multivariate level, it came close to significance ($p=.051$). These results suggest that perhaps the ability for one to describe their experiences is needed in order to demonstrate higher levels of Nonreactivity to Inner Experience.

6.3 Research Question Three: Acting with Awareness and Perceived Stress

The third research question asked if there was a significant relationship between the Acting with Awareness dimension of trait mindfulness and perceived psychological stress among first-year DPT students. As shown in Table 3, the bivariate data analysis showed that the Acting with Awareness subscale had a statistically significant negative correlation with total perceived psychological stress scores, $r(46)=-33$, $p<.05$, but did not show any significant intercorrelations with the other four trait mindfulness subscales (Observing, Describing, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience). Table 5 presents data indicating that at the multivariate level, the Acting with Awareness subscale scores were not significantly related to total perceived psychological stress scores, B=-.19, SE=.14, β=-.16, $p=.18$. It appears that Acting with Awareness does not have a significant relationship with perceived psychological stress.

6.4 Research Question Four: Nonjudging of Inner Experience and Perceived Stress

The third research question asked if there was a significant relationship between the Acting with Awareness dimension of trait mindfulness and perceived psychological stress among first-year DPT students. As shown in Table 3, the bivariate data analysis showed that the Acting with Awareness subscale had a statistically significant negative correlation with total perceived psychological stress scores, r(46)=-33, p<.05, but did not show any significant intercorrelations with the other four trait mindfulness subscales (Observing, Describing, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience). Table 5 presents data indicating that at the multivariate level, the Acting with Awareness subscale scores were not significantly related to total perceived psychological stress scores, B=-.19, SE=.14, β=-.16, *p*=.18. It appears that Acting with Awareness does not have a significant relationship with perceived psychological stress.

6.5 Research Question Five: Nonreactivity to Inner Experience and Perceived Stress

The fifth research question asked if there was a significant relationship between the Nonreactivity to Inner Experience dimension of trait mindfulness and perceived psychological stress among first year DPT students. Bivariate data analysis showed that Nonreactivity to Inner Experience had a significant negative correlation with total perceived psychological stress scores, r(46)=−49, p<.01, and positive intercorrelations with the Describing subscale of trait mindfulness, r(46)=.37, p<.01 and the Nonjudging of Inner Experience trait mindfulness subscale, r(46)=.45, p<.01. Further, multivariate data analyses presented in Table 5 showed that Nonreactivity to Inner Experience trait mindfulness subscale scores were not significantly related to total perceived psychological stress scores, B=−.43, SE=.21, β=−.26, *p*=.051. Nonreactivity to Inner Experience does not appear to predict students' perceived psychological stress.

6.6 Research Question Six Overall Trait Mindfulness and Perceived Stress

The sixth research question asked if there was a significant relationship between overall trait mindfulness and perceived psychological stress among first year DPT students. Table 3 presents data indicating that at the bivariate level higher overall trait mindfulness scale scores were significantly related to lower total perceived psychological stress scores, *r*(46)= −.54, *p*<.01. When examining the trait mindfulness subscales individually, Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience showed significant negative correlations with total perceived psychological stress scores.

Further multiple linear regression showed that Nonjudging of Inner Experience was the only trait mindfulness subscale that showed a significant correlation to total perceived psychological stress scores. These results suggest that Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience demonstrated a synergistic action in tandem. However, Nonjudging of Inner Experience was the strongest predictor of perceived stress in this study when these three facets were examined individually.

7. Conclusions, Implications and Recommendations

This explanatory correlational research study investigated the individual relationships between the five facets of trait mindfulness and perceived psychological stress in first year DPT students. The findings were relevant to practice because previous research on the DPT population has highlighted that first year DPT students experience high levels of stress and may be unable to manage it effectively. Moreover, prolonged exposure to unmanaged stress can be detrimental to negative health and student outcomes as well as professional burnout.

This study's bivariate correlational analysis indicated that the Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience facets of trait mindfulness were negatively correlated at a statistically significant level with students 'overall perceived psychological stress. Final multiple linear regression analysis further examined whether Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience remained related to students 'perceived psychological stress when all three were simultaneously regressed on total perceived psychological stress scores. The final results indicated that Nonjudging of Inner Experience (p=.003) was the strongest predictor of students 'perceived psychological stress in this study.

7.1 Conclusions

7.1.1 Research Question One: Observing and Perceived Stress

The lack of correlation between the Observing facet and total perceived psychological stress was inconsistent with findings from three previous studies. Bodenlos et al. (2015) found negative associations with all five facets of trait mindfulness in a sample of 310 undergraduate college students, including Observing, r(308)= −.164, p<.01. Vasudevan and Reddy (2019) also found a negative correlation between Observing and perceived psychological stress in young adults, r(148)= −.197, p<.01.

However, the lack of a statistically significant negative correlation between the Observing facet of trait mindfulness and perceived psychological stress was consistent with the findings of several other studies. Lu et al.

(2019) examined the relationship between four of the facets of trait mindfulness and perceived psychological stress in a sample of undergraduate nursing students using the FFMA and PSS-10. At the bivariate level, the results of their study indicated there was no statistically significant correlation between the Observing facet and perceived psychological stress. However, further analysis indicated that Observing showed a low correlation with the facets of Nonjudging of Inner Experience and Acting with Awareness and a moderate positive association with the facet of Nonreactivity of Inner Experience. These results suggested the only way observing influenced perceived psychological stress was through the facet of Nonreactivity of Inner Experience.

The results of this study did not indicate a statistically significant relationship between the Observing facet of trait mindfulness and perceived psychological stress; however, observing is necessary to bring one's attention and awareness to the present moment, which is a fundamental element of Kabat-Zinn's (1994) working definition of mindfulness. Lindsay and Creswell (2017) described observing as an attention monitoring skill. They further noted it is often an introductory skill used to train attention to notice what is happening in the present moment. A possible explanation for the lack of correlation between Observing and perceived psychological stress in this study could be because, although the skill of observing brings awareness to perceived psychological stress and its associated symptoms, on its own, Observing does not reduce perceived psychological stress (Lindsay & Creswell, 2017). In fact, a hypervigilant observer may experience increased perceptions and symptoms of stress (McBride, 2022) and higher levels of psychological distress (Harnett et al., 2016).

7.1.2 Research Question Two: Describing and Perceived Stress

The lack of correlation between the Describe facet of trait mindfulness and perceived psychological stress was inconsistent with findings from previous studies (Bodenlos et al., 2015; McBride et al., 2022; Vasudevan & Reddy, 2019). However, although Describing did not demonstrate a statistically significant relationship with perceived psychological stress in this study, Describing did show intercorrelation with other facets of trait mindfulness, including Acting with Awareness and Nonreactivity of Inner Experience. Further, the results of this study indicated that overall levels of trait mindfulness showed a statistically significant negative correlation with total perceived psychological stress. Therefore, a possible explanation for this study's lack of correlation between Describing and perceived psychological stress could be because describing may not work alone to decrease perceived psychological stress. It is possible that the students in this study's sample believed they were unable to describe their experiences in words.

7.1.3 Research Question Three: Acting with Awareness and Perceived Stress

The results of the bivariate correlation analysis indicating the statistically significant negative correlation between Acting with Awareness and perceived psychological stress is consistent with previous findings (Bodenlos et al., 2015; Ede et al., 2022; Fino et al., 2021; Harnett et al., 2016; Lu et al., 2019; Mayer et al., 2019; McBride et al., 2022; Vasudevan & Reddy, 2019). However, the results of the multivariate analysis indicated that Acting with Awareness was not a significant predictor of students 'perceived psychological stress. This result was unexpected, as awareness is fundamental to the concept of mindfulness as defined by Kabat-Zinn (1994) and refers to one actively and intentionally choosing where to focus their attention. This finding is also inconsistent with findings from previous studies (Bodenlos et al., 2015; Mayer et al., 2019; McBride et al., 2022; Vasudevan & Reddy, 2019). For example, Mayer et al. (2019) found that Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity of Inner Experience significantly predicted perceived psychological stress in undergraduate college students. Similarity, Lu et al. (2109) reported the same three facets predicted perceived psychological stress in undergraduate nursing students. A possible explanation for this unexpected result in the study is that at the graduate level, healthcare students may have difficulty maintaining focused attention on the present moment. The difficulty in maintaining intentional and focused attention in this study's sample may be attributed to difficulty balancing the increased academic demands in a doctorate-level DPT program.

7.1.4 Research Question Four: Nonjudging of Inner Experience and Perceived Stress

The results of the bivariate correlation analysis were consistent with previous studies which found statistically significant negative correlations between Nonjudging of Inner Experience and perceived psychological stress (Bodenlos et al., 2015; Ede et al., 2020; Fino et al., 2021; Harnett et al., 2016; Mayer et al., 2019; McBride et al., 2022; Vasudevan & Reddy, 2019). However, results from Mayer et al. (2019) and Lu et al. (2019) also indicated that Acting with Awareness and Nonreactivity to Inner Experience also significantly predicted students ' perceived psychological stress. Although these two facets did not significantly predict perceived psychological stress in the present study, there was a statistically significant positive intercorrelation between Nonjudging of Inner Experience and Nonreactivity to Inner Experience, which suggests these two facets are related to students ' perception of stress and appear to work in tandem.

A potential explanation for these discrepant results is that perhaps the students in this study's sample had previously been introduced to the skills of nonjudging of inner experience and nonreactivity to inner experience, two essential elements of mindfulness practice. According to Kabat-Zinn (1994), remaining nonjudgmental as thoughts arise and resisting the ability to be overtaken by them is challenging. It was unknown if the students in

this study's sample had previous mindfulness training or were avid mindfulness practitioners. It is reasonable to assume that developing the ability to be non-judgmental of one's thoughts would require time and effort, especially for those who do not innately possess higher levels of this mindfulness trait.

Another potential explanation for the discrepancy from Mayer et al. (2019) and Lu et al. (2019) could be that this study's sample consisted of doctoral level graduate students. According to Lazarus and Folkman (1984), stress appraisals can be considered threatening and challenging. Therefore, students in this sample may have been more likely to maintain a nonjudgmental stance and to not appraise their academic experiences as threatening. Consequently, they might have been less likely to respond with negative emotions.

7.1.5 Research Question Five: Nonreactivity to Inner Experience and Perceived Stress

Nonreactivity is accomplished by permitting distressful thoughts, emotions, and experiences to be fleeting without responding to alter them in any way (Zou et al., 2020). Nonreactivity to Inner Experience was not a predictor of perceived psychological stress in this study, which was inconsistent with previous studies. However, Mayer et al. (2019) and Lu et al. (2019) both found Nonreactivity to be a statistically significant predictor of students 'perceived psychological stress, along with the facets of Acting with Awareness and Nonjudgement of Inner Experience. Although Nonreactivity to Inner Experience was not a significant predictor of perceived psychological stress in this study, it did come close to significance (p=.05), which suggested the possibility that nonreactivity could be related to students 'perceived psychological stress. A possible explanation is perhaps Nonreactivity has to do with the final step in mindfulness practice. Mayer et al. (2019) raised the possibility that the trait mindfulness facets of Acting with Awareness and Nonjudging of Inner Experience provide the groundwork for ideal psychological conditions that then promote Nonreactivity to Inner Experience when distressing experiences arise. They further suggested that as Acting with Awareness and Nonjudging of Inner Experience foster Nonreactivity to Inner Experience over time, the synergetic effect of these mindfulness facets may lead to lower levels of perceived psychological stress.

7.1.6 Research Question Six Overall Trait Mindfulness and Perceived Stress

The statistically significant negative correlation found between overall trait mindfulness and students 'perceived psychological stress was expected and consistent with a previous study conduced by Vasudevan & Reddy, 2019). When examined individually, only Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity of Inner Experience showed a statistically significant negative correlation with students 'perceived psychological stress. However, it appears that the five facets of trait mindfulness interact with each other and have a synergetic effect on perceived psychological stress levels.

According to the results of this study, it seems that the five facets of trait mindfulness interact and potentially build upon one another to reduce perceived psychological stress. Previous studies have highlighted the interaction and influence of the facets of Acting with Awareness, Nonjudging of Inner Experience, and Nonreactivity to Inner Experience on perceived psychological stress (Fino et al., 2021; Lu et al., 2019; Mayer et al., 2019). Fino et al. (2021) highlighted that keeping a nonjudgmental stance would lessen the tendency for negative stress appraisals, which would then lead to less reactivity. This description of the pathway to reducing reactivity resonates with Kabat-Zinn's (1994) working definition of mindfulness and explanation of the benefits of maintaining a nonjudgmental stance toward inner experiences.

As healthcare programs strive to produce well-trained and competent healthcare professionals, equipping students with effective stress management strategies such as mindfulness will be essential to mitigating the adverse effects of stress and potential burnout. As the evidence of the benefits of mindfulness continues to grow, this study contributes to the literature on how the individual facets of trait mindfulness influence perceived psychological stress. Additionally, this study provides new insight because this was the first study to explore these relationships in the DPT student population. A better understanding of these individual relationships and how trait mindfulness influences students' perceived psychological stress can guide physical therapy educators and programs who seek to include mindfulness practice into their DPT curriculum to assist students with stress management.The limitations of this study create opportunities for future research to expand on the foundational findings this study provided and the depth of knowledge on the influence the individual facets of trait mindfulness have on perceived psychological stress among DPT students. A final consideration for future research would be a pre- and post-design that evaluated the effectiveness of a mindfulness intervention within a DPT curriculum that focused on the facets of trait mindfulness: acting with awareness, nonjudging of inner experience, and nonreactivity of inner experience. As the results of this study indicated that these three facets appear to have a synergistic effect and act in tandem, future research to examine how focused mindfulness interventions influence students' perceived psychological stress could provide educators insight into how to design and implement targeted mindfulness interventions within the curriculum for their students.

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Table 1
Descriptive Analysis of Categorical Student and Demographic Characteristics (n=48)

Variable	N	%
Campus where enrolled		
Campus 1	21	43.8
Campus 2	8	16.7
Campus 3	16	33.3
Campus 4	3	6.3
Term of the DPT program participant		
First	46	97.9
Second	1	2.1
Residential or flex DPT program		
Residential DPT Program	39	81.3
Flex DPT Program	9	18.8
Gender		
Male	25	53.2
Female	22	46.8
Missing	1	
Race/Ethnicity		
White	36	75.0
Black	3	6.3
Asian	5	10.4
Other	4	8.3
Marital Status		
Single	41	85.4
Married	4	8.3
Domestic Partnership	3	6.3
Employment Status		
Unemployed	34	70.8
Employed Full Time	8	16.7
Employed Part Time	3	6.3
I plan to only work during semester breaks	2	4.2
Other	1	2.1

Table 2
Descriptive Analysis of Age, Stress, and Mindfulness Scores (n=48)

Variable	M (SD)	Minimum/ Maximum	Skew (SE)	Kurtosis (SE)
Age	24.21 (2.40)	22.00-35.00	2.26 (.34)	7.63 (.67)
Stress Total Scale	19.73 (5.28)	7.00-32.00	–.07 (.34)	–.18 (.67)
Mindfulness Total Scale	121.83 (13.34)	97.00-147.00	.32 (.34)	–.39 (.67)
Mindfulness Observing Subscale	26.19 (5.17)	14.00-35.00	–.52 (.34)	–.03 (.67)
Mindfulness Describing Subscale	25.73 (4.42)	16.00-35.00	.28 (.34)	.11 (.67)
Mindfulness Acting with Awareness Subscale	23.44 (4.63)	13.00-32.00	.06 (.34)	–.24 (.67)
Mindfulness Nonjudging of Inner Experience	25.10 (5.57)	11.00-37.00	.17 (.34)	.62 (.67)
Mindfulness Nonreactivity to Inner Experience Subscale	21.85 (3.22)	16.00-30.00	.40 (.34)	.34 (.67)

Table 3
Pearson's r Correlation Analysis Between Age, Stress, and Mindfulness Scores (n=48)

Variable	1	2	3	4	5	6	7	8
1. Stress Total Scale	--	–.54**	–.23	–.19	–.33**	–.58**	–.49**	–.02
2. Mindfulness Total Scale		--	.58**	.70**	.70**	.52**	.67**	.13
3. Mindfulness Observing Subscale			--	.33*	.25	–.08	.28	.12
4. Mindfulness Describing Subscale				--	.42**	.13	.37**	.05
5. Mindfulness Acting with Awareness Subscale					--	.25	.25	.17
6. Mindfulness Nonjudging of Inner Experience Subscale						--	.45**	–.07
7. Mindfulness Nonreactivity to Inner Experience Subscale							--	.13
8. Age								--

*p<.05 **p<.01

Table 4
Independent Samples T-Test and One-Way-ANOVA Analysis of Total Stress Scores by Demographic Characteristics (n=45)

Variable	n	M (SD)	t/F (df)	p
Gender			–1.16 (45)	.13
Male	25	19.04 (4.79)		
Female	22	20.82 (5.71)		
Race/Ethnicity			1.11 (3, 44)	.36
White	36	20.08 (4.77)		
Black	3	21.33 (8.08)		
Asian	5	19.80 (6.53)		
Other	4	15.25 (6.55)		
Martial Status			1.76 (2, 45)	.18
Single	41	19.15 (5.22)		
Married	4	23.00 (2.16)		
Domestic Partnership	3	23.33 (7.77)		

Table 5
Multiple Linear Regression Analysis Examining Total Stress Scale Scores with Mindfulness Subscale Scores (n=48)

Variable	B (SE)	β	p
Mindfulness Acting with Awareness Subscale	–.19 (.14)	–.16	.18
Mindfulness Nonreactivity to Inner Experience Subscale	–.43 (.21)	–.26	.051
Mindfulness Nonjudging of Inner Experience Subscale	–.40 (.12)	–.42	.003

Note. $F(3, 44)=10.69$, $p<.001$. $R2=.42$, adjusted $R2=.38$.