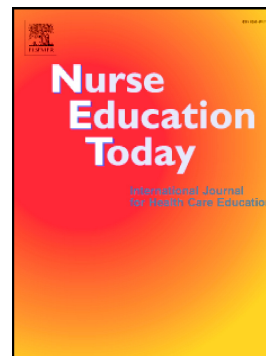


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Trait mindfulness and nursing students' psychological stress: A regression and mediation analysis

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TRAIT MINDFULNESS AND NURSING STUDENTS' PSYCHOLOGICAL STRESS: A
REGRESSION AND MEDIATION ANALYSIS

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Nursing Students' Trait Mindfulness and Psychological Stress: A Correlation and Mediation

Analysis

Abstract

Background: Nursing students face a great amount of psychological stress during their nursing education. Mindfulness-based training has received increased recognition from nurse educators regarding its effect on reducing students' psychological stress. Study evidence has supported that cultivation of trait mindfulness through Mindfulness-based training was the key to this effect. However, there is a lack of research that focuses on intricate relationships between various facets of trait mindfulness and psychological stress.

Objective: Examining the relationships between various trait mindfulness facets and psychological stress

Design: A cross-sectional design was used to collect data on trait mindfulness facets and psychological stress.

Participants: A convenience sample of 99 undergraduate nursing students from a Bachelor of Nursing program completed this study.

Setting: This study was conducted in a university in the south-eastern United States.

Method: Participants completed an online questionnaire, which collected their demographic information, trait mindfulness (the *Five Factor Mindfulness Questionnaire*), and psychological stress (the *Perceived Stress Scale-10*). Correlation and mediation analyses were applied.

Results: Other than the trait mindfulness facet of observing, the remaining three facets (acting with awareness, non-judging, and non-reactivity) were negatively correlated with psychological stress. Observing had little to low correlations with non-judging and acting with awareness, but attained a moderately positive correlation with non-reactivity. Moreover, observing could indirectly predict psychological stress, when non-reactivity served as a mediator. Finally, non-

judging partially mediated the relationship between acting with awareness and psychological stress.

Conclusions: The results of the current study can help nurse educators better understand the intricate relationships between various facets of trait mindfulness and psychological stress. Specifically, facets of acting with awareness, non-judging, and non-reactivity are directly relevant to the reduction of psychological stress. Therefore, regardless of formal or informal practices of mindfulness, nurse educators ought to assist students in cultivating these facets as means toward stress management.

Keywords: nursing education, stress management, trait mindfulness, psychological stress

Nursing Students' Trait Mindfulness and Psychological Stress: A Correlation and Mediation
Analysis

Introduction

Stress management is critical in nursing education. Research has shown that, world-wide, nursing students often experience a great deal of stress in their academic training and clinical practice (Altiok and Üstün, 2013; Pryjmachuk and Richards, 2007; Pulido-Martos et al., 2012). Without proper stress management, nursing students may develop various physical (e.g., headache, vertigo) and emotional (e.g., depression, anxiety) stress symptoms, which could adversely influence their academic and clinical performance. Among numerous stress-management approaches, in nursing education, mindfulness-based training (MT) has received increased recognition from scholars all over the world (Chen et al., 2013; Kang et al., 2009; Praissman, 2008; Ratanasiripong et al., 2015). Over the past 10 years, many studies have shown that MT can effectively decrease not only nursing students' psychological stress (i.e., self-appraisal of experience as being stressful; e.g., Praissman, 2008), but also stress-related physiological responses (e.g., systolic blood pressure; Chen et al., 2013).

MT comprises various practices that essentially help people cultivate mindfulness as a personal characteristic (i.e., trait mindfulness). It is a long lasting individual trait that features "a receptive attention and awareness of present events and experience" (Brown et al., 2007, p.212). Empirical evidence supports the notion that the development of trait mindfulness through MT plays a significant role in decreasing one's psychological stress. For instance, Carmody and Baer (2008) reported that the salutary effect of MT on participants' (174 adults) psychological stress was partially mediated by their increase in trait mindfulness during the course of MT. Moreover, Baer et al. (2012) found that participants' (87 adults) increase of trait mindfulness in

the first three weeks of MT significantly predicted the decrease of their psychological stress, which occurred in the seventh (last) week of MT. Given these findings, other than studying the effect of MT on stress reduction, researchers need to examine the relationship between trait mindfulness and psychological stress thoroughly. The corresponding results will be particularly useful for nurse educators when they introduce MT to their students as a stress management approach.

Background

Trait mindfulness is multi-faceted. Although no consensus has been reached in the literature regarding how many facets trait mindfulness entails, four facets have received researchers' constant attention. These are observing, acting with awareness, non-judging, and non-reactivity (Baer et al., 2006; Brown et al., 2007; Cardaciotto et al., 2008; Kabat-Zinn, 1994). The facet of observing attends to one's concentration on the details of his/her present-moment experiences, such as body sensations, emotions, and thoughts. The facet of acting with awareness features an open, receptive, and lucid awareness of being in the present. These two facets reflect the essence of trait mindfulness emphasized by Brown et al. (2007) in the current study.

In comparison, although non-judging and non-reactivity are also important facets of trait mindfulness, some scholars such as Brown et al. (2007) perceived them as qualities of trait mindfulness, but not its essence. Specifically, the facet of non-judging targets an individual's tendency to not evaluate his/her thoughts or feelings as being good or bad. The facet of non-reactivity focuses on one's ability to counteract his/her inclination to act upon feelings and/or distressing thoughts.

Lindsay and Creswell (2017) perceived both non-judging and non-reactivity as featuring a mental attitude of acceptance, which was essential in helping people regulate their emotions when addressing psychological stress. They considered observing as underlining attention monitoring, which was helpful for people to concentrate on their stress-related symptoms, but not necessarily being conducive to stress reduction. Lastly, they deemed acting with awareness as reflecting both attention monitoring and acceptance. Thus, this facet should also contribute to stress reduction.

Surprisingly, although recent studies support the salutary effects of MT on reducing psychological stress (e.g., Dobkin and Hutchinson, 2013; Kallapiran et al., 2015; Lenz et al., 2016; Raab et al., 2015), in the literature few studies reported correlations between the above four facets of trait mindfulness and psychological stress. Bodenlos et al. (2015) examined such correlations based on 310 undergraduate students from a small liberal arts college in the North-eastern United States. They found that students' psychological stress was statistically significantly associated with all four trait mindfulness facets – observing ($r = -.16$), acting with awareness ($r = -.48$), non-judging ($r = -.43$), and non-reactivity ($r = -.44$). Additionally, Harnett et al. (2016) found significant correlations between these four facets and psychological stress based on 452 college students and community residents: observing ($r = .12$), acting with awareness ($r = -.43$), non-judging ($r = -.42$), and non-reactivity ($r = -.17$). The results of these two studies were similar for the facets of acting with awareness and non-judging but were different for observing and non-reactivity.

Generally speaking, more research is needed to examine the relationships between various facets of trait mindfulness and psychological. Moreover, since observing and acting with awareness conceptually tie to the essence of trait mindfulness (Brown et al., 2007), these two

facets may lay the foundation to develop non-judging and non-reactivity. Meanwhile, because those latter two facets are critical to stress management (Lindsay and Creswell, 2017), it is reasonable to assume that they mediate the relationship between observing/acting with awareness and psychological stress. However, no studies have been found to examine these mediation effects. As more and more nurse educators choose MT to help students cope with stress, understanding the intricate relationships between trait mindfulness and psychological stress can inform nurse educators to appropriately and intentionally implement MT among their students so as to attain best outcomes. To this end, the aims of the current study are (a) to investigate the correlations between four facets of trait mindfulness and psychological stress among nursing students, and (b) to examine whether and how non-judging and non-reactivity mediate the relationship between observing/acting with awareness and psychological stress.

Methods

Sample Description

A convenience sample of 99 nursing students completed an online questionnaire. Seven (7%) of them were males, and 92 (93%) were females. The average age was 20.31 ($SD = .70$), ranging from 18 to 24 years old. Regarding race/ethnicity, 93 self-identified as Caucasian, one African American, one Hispanic/Latino, three with more than one race, and one missing value.

Study Design, Setting, Procedure, and Ethical Consideration

The study utilized a cross-sectional and was conducted in a university located in the southeastern United States. The research proposal was approved by the university's Institutional Review Board. Students were recruited by a nursing instructor in a course. Students were informed of the purpose, procedure, risks, and benefits of participating in this study.

Participation was voluntary. The research team developed the online questionnaire using Survey

Monkey® and activated the anonymous function to disable the IP address tracking. The study link was sent to all the students in a particular course by email, and the link was activated over two weeks, during which time two study reminders were sent. The online questionnaire included a request for demographic information (e.g., age and gender), measures for trait mindfulness, and psychological stress. Although there were 114 students in the course, only 107 responded to the survey. Among 107 entries, eight did not finish the survey. In the end, we had 99 participants completed the survey, and there was no missing value on the main measures of trait mindfulness and psychological stress.

Instruments

Five Factor Mindfulness Questionnaire (FFMQ). This 39-item scale (Baer et al., 2006) includes five subscales: (a) Observing (e.g., When I'm walking, I deliberately notice the sensations of my body moving); (b) Acting with awareness (e.g., I found myself doing things without paying attention); (c) Describing (e.g., I'm good at finding the words to describe my feelings); (d) Non-judging (e.g., I criticize myself for having irrational or inappropriate emotions); and (e) Non-reactivity (e.g., I perceive my feelings and emotions without having to react to them). Given the aims of this study, we did not use the subscale of describing. Moreover, some scholars argued that describing was not central to mindfulness (Cardaciotto et al., 2008). Participants rate each item on a 5-point Likert scale ranging from "1" (never or very rarely true) to "5" (very often or always true). All items in acting with awareness and non-judgment subscales are reverse coded. A higher score represents a higher level of trait mindfulness. The FFMQ had previously demonstrated convergent validity with the *Self-Compassion Scale* (SCS; Neff, 2003) and discriminant validity with the *White Bear Suppression Inventory* (WBSI; Wegner and Zanakos, 1994). The Cronbach alphas for the five subscales

were: .75 (Non-reactivity), .83 (Observing), .87 (Act with awareness), and .87 (Non-judging) (Baer et al., 2006). In the current study, the Cronbach's alphas for the four subscales were .74 (Non-reactivity), .74 (Observing), .83 (Acting with awareness), and .84 (Non-judging).

Perceived Stress Scale-10 (PSS-10). Cohen and Williamson (1988) developed this 10-item scale to measure psychological stress. A sample item is "In the last month, how often have you been upset because of something that happened unexpectedly?" Respondents rate each item on a 5-point Likert scale ranging from 1 (never) to 5 (very often). A total score is calculated to reflect one's perceived stress, and a higher score represents a higher level of perceived stress. Scores range from 0 to 40. Convergent validity was demonstrated by the significant correlation between PSS-10 and the *State-Trait Anxiety Inventory-Trait* (STAI-T; Spielberger, 1983). Discriminant validity was indicated by the non-significant correlation between PSS-10 and the *Sensation Seeking Scale-Form V* (SSS-V; Zuckerman and Eysenck, 1978). The Cronbach alpha for the PSS-10 was .89. In the current study, the Cronbach's alpha for PSS-10 was .85.

Statistical Analysis

Statistical analyses were performed using SPSS-22 statistical software. The mediation tests were examined via the PROCESS macro in SPSS (Hayes, 2013). The descriptive data reported included means (M), standards deviations (SD), kurtosis, and skewness statistics of the participants' scores on four subscales in FFMQ and PSS-10 (see Table 1). Normality of data distribution was assessed using kurtosis and skewness statistics. Curran et al. (1996) recommended a score set with its skewness within the range of (-2, +2) and kurtosis within the range of (-7 to +7) as indicating an approximately normal distribution. Accordingly, all score distributions in the current study were considered as following normal distribution (see Table 1).

Subsequently, scatterplots between participants' scores on four subscales in the FFMQ and PSS-10 were examined for the assumptions of linearity (i.e., a linear relationship between two score sets) and homoscedasticity (i.e., equal variance across all scores in a variable) (Kirk, 2008). The results suggested no assumption violation and provided necessary conditions for conducting mediation tests in PROCESS macro (Hayes, 2013). Since mediation tests comprised a series of multiple linear regressions, the sample size was estimated (in G*Power) given a maximum of three predictors (non-judging, non-reactivity, and either acting with awareness or observing), $\alpha = .05$, a moderate effect size, and a power of .80. This resulted in a size of 77. The current study had 99 participants, which exceeded our estimated sample size.

[Table 1 here]

The first research aim, which involved correlational tests, was explored using Pearson bivariate correlation analysis. The degree of correlation was determined based on Cohen's (1988) guideline – i.e., .10 (small), .30 (moderate), .50 (large). The second research aim, which involved mediation analyses, was examined via the PROCESS macro in SPSS (Hayes, 2013). Figure 1 displayed the conceptual framework of the tested mediation model, in which non-judging and non-reactivity served as two parallel mediators (i.e., no causal relationship was assumed between them). The coefficient τ' was the direct effect of observing/acting with awareness on psychological stress, while controlling the effect of non-judging and non-reactivity on such stress. Observing/acting with awareness might also indirectly influence psychological stress through non-judging and/or non-reactivity, the effects of which were captured by the product of coefficients a and b (i.e., ab), as well as c and d (i.e., cd). Coefficient τ was the total effect of observing/acting with awareness on psychological stress, given no mediators. All coefficients (τ , τ' , a , b , c , and d) were unstandardized.

[Figure 1 inserted here]

The alpha level was set at .05 to help determine whether or not τ and τ' were statistically significant. A full mediation occurred if τ was statistically significant, but not τ' (Baron and Kenny, 1986). However, if both τ and τ' were statistically significant and the magnitude of τ was larger than τ' , a partial mediation was presented (Baron and Kenny, 1986). The significance of indirect effect was decided based on its 95% confidence interval (CI) estimated using bias-corrected bootstrap method. This is a resampling approach (e.g., 2000 bootstrap samples) with replacement and it corrects the bias which can result in the estimated CI not being centered on the true parameter value (Fritz and MacKinnon, 2007). If the CI did not cover zero, the corresponding indirect effect was statistically significant.

Results

The results on Pearson's bivariate correlations showed that observing had little correlation with acting with awareness and non-judging, but it reached moderately positive correlation with non-reactivity. Except for observing, the remaining three facets of trait mindfulness had moderately positive inter-correlations ($r \approx .30$, Cohen, 1988). PSS-10 reached moderate to high degrees ($r \approx .50$, Cohen, 1988) of negative correlations with all other facets, but had zero correlation with observing.

The mediation analyses revealed that the total effect of observing on psychological stress was statistically non-significant ($\tau = -.05$, $p = .61$), so as its direct effect ($\tau' = .13$, $p = .13$) (see Model A in Figure 2). The results further revealed that non-reactivity was the only path through which observing could influence psychological stress, $ab = -.13$ (-.27, -.03). Meanwhile, the effect of non-judging on psychological stress was still statistically significant ($d = -.34$, $p < .01$)

given the presence of observing and non-reactivity. Altogether, observing, non-reactivity, and non-judging accounted for 37% of the total variance of psychological stress.

In comparison, the total effect of acting with awareness on the psychological stress of nursing students was statistically significant ($\tau = -.40, p < .01$), as well as its direct effect ($\tau' = -.22, p < .01$) (see Model B in Figure 2). The results on indirect effects disclosed that non-judging partially mediated (since $|- .40| > |- .22|$) the relationship between acting with awareness and psychological stress, $cd = -.11 (-.20, -.04)$. The effect of non-reactivity on psychological stress was still statistically significant ($b = -.48, p < .01$) given the presence of acting with awareness and non-judging. Altogether, acting with awareness, non-reactivity, and non-judging accounted for 43% of total variance of psychological stress.

[Figure 2 inserted here]

Discussion

In this study, observing and acting with awareness had zero correlation and thereby reflected two distinct facets of trait mindfulness that underlined awareness and attention. Observing, which reflects one's ability to concentrate on relevant physical (e.g., headache) and psychological (e.g., worry) symptoms, by itself, was not correlated with individual psychological stress. Interestingly, this correlation was reported as small and negative in Bodenlos et al.' (2015) study, but as small and positive in Harnett et al.'s (2016) study. These conflicting findings evidenced that observing might not be a good predictor of psychological stress. Conversely, acting with awareness was a good predictor of psychological stress. This trait mindfulness facet emphasizes a present-centered awareness that is open and receptive, thus entailing a mental attitude of acceptance, which is key to emotion regulation and managing psychological stress (Lindsay and Creswell, 2017). Both non-judging and non-reactivity had high and negative

correlations with psychological stress. Since Lindsay and Creswell (2017) considered these two facets as mainly attending to acceptance, the current results were expected. In practice, non-judging could help people lessen their negative evaluation of current levels of felt stress, whereas non-reactivity may reduce one's tendency to act upon his/her psychological stress instantly.

The results of the mediation tests revealed that although observing by itself did not predict psychological stress; this facet could indirectly impact individual psychological stress via non-reactivity, but not non-judging. These outcomes suggested that observing did not contribute to the decrease of perceived psychological stress unless non-reactivity was developed. By contrast, acting with awareness could simultaneously have an impact on an individual's psychological stress through direct and indirect paths. Notably, the indirect path involved the cultivation of the mindfulness trait of non-judging, but not non-reactivity. Overall, the above findings indicated that observing and acting with awareness were not only qualitatively different, but their assumed impact on perceived psychological stress was uniquely mediated by cultivating different trait mindfulness facets that focused on an attitude of acceptance. Finally, non-judging and non-reactivity helped predict individual perceived psychological stress regardless of whether or not they served as a mediator. These results supported the notion that trait mindfulness facets focusing on acceptance, played an essential role in managing psychological stress.

Implications

The results of this study present important considerations for nurse educators who are planning to incorporate MT into their teaching or curriculum as a stress management approach for nursing students. MT helps cultivate trait mindfulness, which has been supported by both empirical and anecdote evidence to be closely related to stress reduction (Baer et al., 2012; Carmody and Baer, 2008; Stahl and Goldstein, 2010).

MT often starts with cultivating the trait mindfulness facet of observing, particularly through concentrating on body sensations. For instance, mindfulness breathing directs one's attention to the sense of airflow passing through the nostrils, whereas a mindfulness body scan systematically guides one's attention to physiological sensations over the entire body. However, when teaching these practices for a stress management purpose, nurse educators should be cautious as the current study found no correlation between observing and perceived psychological stress. Research has showed that simply paying attention to stress-related body sensations during MT may sometimes produce more negative feelings (as cited in Lindsay and Creswell, 2017). Thus, when leading MT that primarily exercises observing, nurse educators are encouraged to (a) inform students about the potential of experiencing no or even negative effect of mindfulness practice on psychological stress during the early stage of training; and (b) help students cultivate the trait mindfulness facet of non-reactivity through observing. Regarding psychological stress, non-reactivity targets an individuals' ability to not avoid/ruminate on his/her observed physiological sensations, emotions, and thoughts that are stress related or induced. During MT, nurse educators can intentionally guide students to observe their physical (e.g., headache) or psychological (e.g., anxiety) responses toward stress without turning away or delving into those responses. Meanwhile, nurse educators can further students' stress reduction by guiding them to be non-judgmental (i.e., not to perceive a stress-related response as good or bad) during MT.

Different from observing, the improvement of which can be noticed following a short period of MT, the trait development of acting with awareness takes prolonged exercise on mindfulness. This facet features one's continuous consciousness of what he/she is doing in everyday living. Because of this feature, acting with awareness is a core mindset one needs to

bring to life during and beyond their regular MT. Nurse educators can help students cultivate this facet of trait mindfulness by particularly focusing on informal practices, in addition to formal practices. Generally speaking, formal practices require individuals to set up a regular exercise time (e.g., one hour per day) for MT, whereas informal practices require people to “bring mindful awareness to daily activities” (Stahl and Goldstein, 2010, P. 17), such as eating, working, talking, etc. There are numerous informal mindfulness practices (see Stahl and Goldstein’s [2010] book) which nurse educators can adopt. The key is to weave mindfulness into everyday activities. Also, since we found that non-judging had a mediation effect in establishing an indirect relationship between acting with awareness and perceived psychological stress, nurse educators should foster student trait development of non-judging during informal practices. In practice, students are expected not to judge their perceived stress-related responses (i.e., body sensations, thoughts, or emotions) experienced in their every life as being good or bad, fair or unfair, but simply register those experiences in their moment-by-moment awareness.

Limitations

Considering the study only included a convenience sample of primarily female nursing students at a university in the south-eastern United States, readers need to raise caution when applying our findings to male nursing students and/or nursing students studying in other parts of the country or those outside the United States. Moreover, this study utilized a cross-sectional design. Thus, no causal relationships can be ascertained between the four facets of trait mindfulness examined and their relationships with perceived psychological stress, although these connections are conceptually meaningful.

Conclusion

Nurse educators can play a vital role in helping nursing students manage stress by cultivating trait mindfulness through MT. The results of the current study could help nurse educators better understand the intricate relationships between various facets of trait mindfulness and psychological stress. Specifically, facets (i.e., acting with awareness, non-judging, and non-reactivity) that promote an attitude of acceptance are directly relevant to the reduction of psychological stress. Therefore, regardless of formal or informal practices of mindfulness, nurse educators ought to assist students in cultivating this attitude as a means of stress management.

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Table 1.

Means (M), Standard Deviations (SD), Kurtosis(KU), and Skewness (SK) of Scores From Four Subscales in FFMQ and PSS-10, as Well as Their Bivariate Pearson Inter-Correlations

Variables (n = 99)	M	SD	KU	SK	1	2	3	4	5
1. Observing	3.27	.56	.07	.55	–	-.07	.11	.29**	-.05
2. Acting with Awareness	3.12	.58	-.47	-.21		–	.38**	.21*	-.41**
3. Non-judging	3.11	.65	.25	-.13			–	.24*	-.46**
4. Non-reactivity	2.95	.51	.16	.13				–	-.53**
5. PSS-10	2.98	.60	-.35	.33					–

Note: FFMQ = Five Factor Mindfulness Questionnaire; PSS-10 = Perceived Stress Scale-10; * $p < .05$. ** $p < .01$.

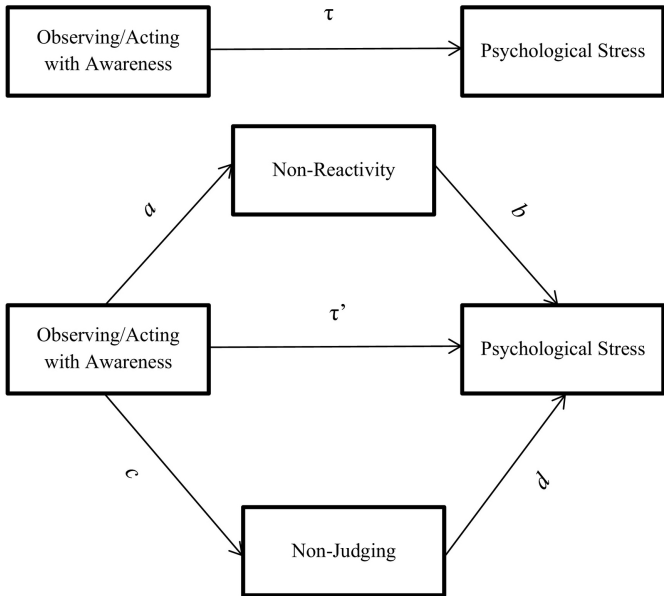
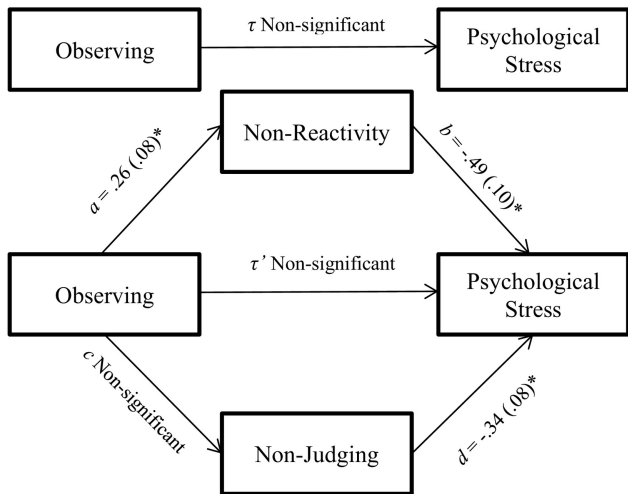


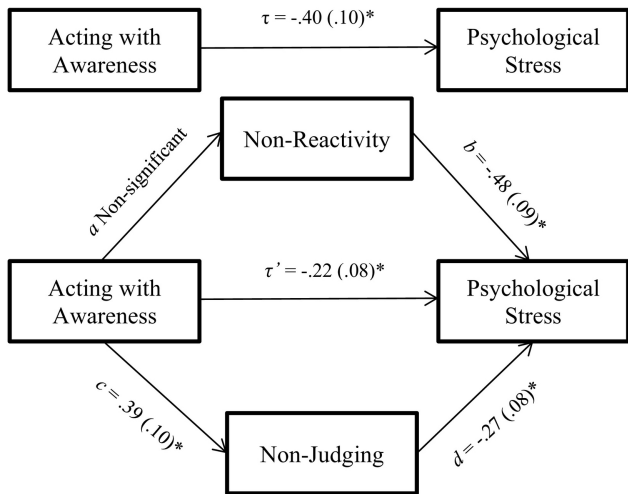
Figure 1

Model A



$$ab = -.13 [-.27, -.03]$$
$$R_A^2 = .37$$

Model B



$$cd = -.11 [-.20, -.04]$$
$$R_B^2 = .43$$

Figure 2