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Predicting experiential avoidance based on interoceptive awareness: The mediating role of neuroticism and difficulties in emotion regulation

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Abstract

Introduction: Experiential avoidance increases the risk of mental health problems in both clinical and non-clinical populations. It is important to identify which psychological variables can influence this concept. The present study aimed to predict experiential avoidance from interoceptive awareness through the mediating roles of neuroticism and difficulties in emotion regulation.

Materials and Methods: This study employed a descriptive-correlational design and used Structural Equation Modeling (SEM). Participants consisted of 265 students from the University of Mohaghegh Ardabili, Iran, during the 2023-2024 academic year, selected via cluster sampling. Participants completed the Multidimensional Assessment of Interoceptive Awareness (MAIA), Acceptance and Action Questionnaire-II (AAQ-II), neuroticism subscale of the NEO Five-Factor Inventory (NEO-FFI), and Difficulties in Emotion Regulation Scale (DERS). Data were analyzed using SPSS-26 and AMOS-24.

Results: Results indicated that the proposed model exhibited a good fit (GFI= 0.950, CFI= 0.976, CMIN/df= 1.94, RMSEA= 0.060), explaining 47% of the variance in experiential avoidance through direct and indirect pathways. Findings revealed that interoceptive awareness directly predicted experiential avoidance (β= 0.127, P< 0.05) and indirectly predicted it through the sequential mediation of neuroticism and difficulties in emotion regulation (β= -0.319, P< 0.05). Neuroticism alone significantly mediated the relationship, whereas difficulties in emotion regulation only contributed to mediation when combined sequentially with neuroticism.

Conclusion: These findings underscore the potential for mental health practitioners to design interventions targeting experiential avoidance by enhancing interoceptive awareness, improving emotion regulation strategies, and mitigating vulnerabilities associated with neuroticism.

Keywords: Avoidance behavior, Emotion regulation, Interoception, Neuroticism, Psychological stress

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Introduction

Experiential Avoidance (EA) has been conceptualized as the tendency to suppress, inhibit, or excessively control the frequency or intensity of psychological experiences, such as thoughts, emotions, memories, bodily sensations, and other distressing internal experiences (1). This concept includes not only cognitive and emotional avoidance but also behavioral components (2). Two primary dimensions define experiential avoidance: suppression and active efforts to alter the form, frequency, or contexts of these experiences and their triggering environments (3). Excessive experiential avoidance demands substantial time and energy to manage and control internal events, potentially impairing cognitive, emotional, and behavioral functioning (4). Both clinical and non-clinical populations showing high levels of experiential avoidance are at increased risk for mental health problems (5), and the construct is critical for explaining and predicting a wide range of psychological and behavioral difficulties (6).

One variable that may predict experiential avoidance is interoceptive awareness. Experiential avoidance is associated with and correlated to misperception of bodily cues and poorly integrated somatic information (1). In interoceptive awareness, the interaction between perception of internal bodily states and cognitive appraisal informs choice of response and behavioral regulation, giving rise to approach or avoidance tendencies (7). Heightened awareness of bodily states can mitigate experiential avoidance (8). During interoceptive awareness, sensory inputs from the body's peripheral and central nervous systems convey internal information (9).

Disruption in accurate perception of these internal signals leads to limited or absent utilization of bodily information (10), adversely affecting both mental and physical health (11). Interoceptive signals span a spectrum of internal bodily sensations—hunger, thirst, satiety—and signals related to cardiac, respiratory, and musculoskeletal functions (11), in other words, the holistic state of the organism (12).

Neuroticism is another factor broadly implicated as a risk factor for psychopathology and is linked to experiential avoidance (13). Neuroticism significantly predicts both experiential avoidance and emotional disorders (14). As a stable personality trait, neuroticism is associated with psychopathologies such as anxiety and depression (15). It is one of the strongest personality correlates of negative affect—worry, fear, anger, sadness, irritability—emotional instability, and psychological distress, all of which undermine life satisfaction and quality (16). Emerging evidence suggests that neuroticism and experiential avoidance overlap and may share common underlying mechanisms (17).

Difficulty in emotion regulation is another predictor of experiential avoidance. Poor emotion regulation and inflexible regulatory strategies predict experiential avoidance in both clinical and non-clinical groups (18). Maladaptive use of expressive suppression is considered a key risk factor in the development of experiential avoidance (4). Emotion-regulation difficulties constitute a transdiagnostic risk factor for the onset and maintenance of diverse psychopathologies and play a crucial role in psychological well-being (19). Interoceptive awareness also influences emotion regulation. It is recognized as vital in alexithymia, emotional awareness, and regulation (20). Higher interoceptive sensitivity—the tendency to attend to internal bodily sensations—is associated with problems in impulsive behavior control and poor acceptance of negative emotions (21). Two subscales of interoceptive awareness—"not-distracting" and "self-regulation"—significantly predict cognitive emotion-regulation strategies, indicating a meaningful correlation between interoceptive awareness and emotion regulation (22). Moreover, enhanced interoceptive awareness may benefit individuals high in neuroticism, who tend to be more concerned with their bodily sensations (12). Neuroticism itself predicts maladaptive emotion-regulation strategies, such as experiential avoidance and rumination (23). A meta-analysis examining the relationship between the Big Five personality traits and emotion regulation found that individuals high in neuroticism are less likely to use adaptive regulatory strategies—reappraisal, problem-solving, and mindfulness (24). Although prior studies have examined the direct link between interoceptive awareness and experiential avoidance, the mediating roles of neuroticism and emotion-regulation difficulties have not been

sufficiently explored. Identifying predictors and mechanisms influencing experiential avoidance can guide clinicians and counselors in designing interventions to improve mental health. The present study examines interoceptive awareness as a predictor of experiential avoidance, and the mediating roles of emotion-regulation difficulties and neuroticism. Given that existing research has predominantly focused on the direct relationship between interoceptive awareness and experiential avoidance, this study investigates indirect pathways through mediator variables to address gaps in the literature.

Materials and Methods

The statistical population of this descriptive-correlational study comprised students of Mohaghegh Ardabili University enrolled during the 2023-2024 academic year. The sample group was selected through cluster sampling. Subsequently, the questionnaires were distributed among the selected students. Considering the sample size requirements for conducting structural equation modeling, a sample size of approximately 200 participants is deemed relatively appropriate (25). However, to account for potential practical issues such as incomplete questionnaires, non-response, or lack of cooperation from students, a larger sample size ranging from 250 to 300 participants was targeted.

Research Instruments

A) Acceptance and Action Questionnaire–II (AAQ-II): The original AAQ was developed by Hayes et al. in 2000 and comprised 32 items rated on a 7-point Likert scale (1= never to 7= always). Subsequent versions were shortened to 16 and 9 items. The final 10-item version, developed by Bond et al. in 2011. Test-retest reliability was reported as 0.81 (3 months) and 0.78 (12 months). This version demonstrates higher validity and reliability than its predecessors. In an Iranian validation study by Abbasi et al. reported a significant negative correlation between the AAQ-II and the Difficulties in Emotion Regulation Scale. Discriminant validity indicated the questionnaire could differentiate clinical populations (e.g., individuals with anxiety/depression) from non-clinical groups. The Persian version showed acceptable internal consistency (α= 0.71-0.89) and split-half reliability. Convergent validity of the

Acceptance and Action Questionnaire was confirmed through significant negative correlations with the Beck Depression Inventory-II (r= -0.59), Beck Anxiety Inventory (r= -0.44), Difficulties in Emotion Regulation Scale (r= -0.59), and the General Health Questionnaire-28 (r= -0.62). Divergent validity was supported by significant differences between clinical and non-clinical groups on the emotional experiential avoidance subscale, with clinical participants exhibiting greater avoidance (26). In the current study, Cronbach's alpha was 0.529.

B) Multidimensional Assessment of Interoceptive Awareness (MAIA): Mehling et al. developed the MAIA in 2014, assesses eight dimensions of interoceptive awareness through 32 items rated on a 6-point Likert scale (0= never to 5= always). Subscale Cronbach's alphas ranged from 0.53 to 0.83. Subscales include noticing, not-distracting, not-worrying, attention regulation, emotional awareness, self-regulation, body listening, and trusting. In an Iranian validation study, body listening and trusting merged into a single subscale, while attention regulation was divided into healthy attention to body and sustained attention to body. Exploratory factor analysis revealed eight factors (eigenvalues greater than 1), explaining 59.94% of variance, with acceptable internal consistency (α= 0.53-0.83; highest for body listening, lowest for not-distracting). Convergent validity was assessed using measures of mindfulness, integrative self-awareness, self-regulation, and positive affect. The MAIA subscale of self-regulation demonstrated the strongest significant moderate correlation with positive affect (r= 0.32, *P*< 0.01). Divergent validity was evaluated through measures of anxiety sensitivity, fear of harm, and pain catastrophizing. The MAIA subscale of not worrying showed the strongest significant negative correlation with fear of harm (r= -0.41, *P*< 0.01). The Persian MAIA demonstrated suitable psychometric properties (27). In this study, Cronbach's alpha was 0.904.

C) Neuroticism Subscale: This 12-item subscale employs a 5-point Likert scale (0= strongly disagree to 5= strongly agree). McCrae and Costa in 1989 reported test-retest reliability coefficients of 0.75-0.83 over three months. In an Iranian study by Roshan Chesli et al. the Cronbach's alpha for neuroticism was 0.83, and

the test-retest reliability was 0.80. In this research, construct validity of the NEO-FFI questionnaire was assessed using the revised Symptom Checklist-90 (SCL-R-90). It was found that the neuroticism subscale showed significant positive correlations with all dimensions of this questionnaire, with the highest correlation observed with depression (r= 0.65) and the lowest correlation with social anxiety (r= 0.47) (28). In this study, Cronbach's alpha was 0.860.

D) Difficulties in Emotion Regulation Scale– Short Form (DERS-16): The DERS-16, a shortened version of the 36-item Difficulties in Emotion Regulation Scale, developed by Bjureberg et al. in 2016 and assesses five dimensions of emotion dysregulation: non-acceptance of emotional responses, difficulties in adopting goal-directed behaviors, difficulties in controlling impulsive behaviors, limited access to emotion regulation strategies, and lack of emotional clarity. Items are rated on a 5-point Likert scale (1= almost never to 5= almost always). In an Iranian validation study, alpha was 0.91, confirming reliability and validity. To examine the divergent validity of the present questionnaire, the correlation coefficient between the DERS-16 and the short form of the NEO Personality Inventory was used. The results indicated that, except for extraversion, the other dimensions of these questionnaires showed weak correlations with each other, which demonstrates a relatively good divergent validity (29). In this study, Cronbach's alpha was 0.933. Following approval from Mohaghegh Ardabili University to conduct the study and distribute the questionnaires,

participants were selected through cluster sampling. Prior to participation, students were informed about the voluntary nature of the study, assured of the anonymity and confidentiality of their responses, and provided with a brief overview of the research objectives. Those who consented to participate received a battery of questionnaires, along with a demographic information form. Detailed instructions for completing the questionnaires were also provided. Upon receiving the completed questionnaires, responses were screened, and any incomplete forms were excluded from the analysis. Data were entered into SPSS version 26. No missing data were detected. Univariate outliers were identified and removed using boxplot analysis. Multivariate outliers were identified using the Mahalanobis distance, and were excluded from the final dataset. Composite scores for variables and their respective subscales were calculated using the mean score method. To test the research model and evaluate its fit, Structural Equation Modeling (SEM) was conducted using AMOS version 24.

Results

The final sample included 265 students (67.2% female, 32.8% male; aged 18-35 years). The participants' mean age was 23.25 years (SD= 3.65). Educational levels were distributed as follows: 8 associate degree students (3.0%), 145 undergraduates (54.7%), 93 master's students (35.1%), and 19 doctoral students (7.2%). Table 1 presents descriptive statistics.

Table 1. The scores related to the questionnaires

Variable	Mean	SD	Skewness	Kurtosis	Minimum	Maximum
Clarity	2.37	0.96	0.699	-0.238	1.00	5.00
Goals	3.10	1.06	0.175	-1.078	1.00	5.00
Impulse	2.57	1.06	0.633	-0.533	1.00	5.00
Strategies	2.50	0.97	0.483	-0.530	1.00	5.00
Non-acceptance	2.17	1.04	0.864	-0.108	1.00	5.00
Total DEM	2.55	0.86	0.542	-0.463	1.00	4.81
Neuroticism	2.12	0.77	-0.103	-0.467	0.08	3.92
Noticing	2.70	1.03	0.130	-0.728	0.50	5.00
Not-distracting	2.46	0.87	-0.109	-0.043	0.00	5.00
Not-worrying	2.34	1.24	-0.058	-0.845	0.00	5.00
Healthy attention to the body	2.27	0.97	0.155	-0.482	0.00	5.00
Preservation of attention to body	2.25	1.04	0.286	-0.376	0.00	5.00
Emotional awareness	3.16	1.05	-0.281	-0.637	0.60	5.00
Self-regulation	2.20	1.05	0.290	-0.182	0.00	5.00
Body listening and trusting	2.52	1.18	-0.028	-0.805	0.00	5.00
Total IA	2.51	0.69	0.225	-0.201	1.06	4.34
Total EA	3.81	0.75	0.229	-0.725	2.30	5.60

Skewness and kurtosis coefficients, used to evaluate compliance with the normality assumption, indicate that all variables fall within the acceptable range of ± 2. This finding strongly supports the absence of significant deviations from a univariate normal distribution. Additionally, a fundamental assumption of structural equation modeling requires the presence of linear relationships between independent and dependent variables. As shown in Table 2, the correlation matrix of the research variables is presented.

Table 2. Correlation coefficients for study variables with Pearson corelation test

	Experiential avoidance	Interoceptive awareness	Neuroticism	DEM
1	1			
2	-0.176**	1		
3	0.600**	-0.409**	1	
4	0.613**	-0.337**	0.673**	1

**Correlation is significant at the 0.01 level (2-tailed). Note: (1): Experiential avoidance, (2): Interoceptive awareness, (3): Neuroticism, (4): DEM

Table 2 presents the correlation coefficients among the variables. As illustrated, this table indicates that the independent and dependent variables in the study are correlated. To examine the absence of multicollinearity among predictor variables, the tolerance coefficient (TOL) and Variance Inflation Factor (VIF) were used. The tolerance values for interoceptive awareness, neuroticism, and emotion regulation difficulties were 0.825, 0.509, and 0.542, respectively, all of which exceed 0.40 and fall below 1.00. The VIF values, which are considered acceptable if below 10, were 1.211, 1.964, and 1.845 for interoceptive awareness, neuroticism, and emotion regulation difficulties, respectively.

Thus, it is concluded that no evidence of multicollinearity exists among the variables. The Durbin-Watson statistic, which should ideally range between 1.5 and 2.5 to confirm error independence, yielded a value of 2.032 in the current study, indicating independent residuals. To assess homogeneity of variances, Levene's test was applied. The results of the one-way analysis of variance (ANOVA) revealed a significance level of 0.991 (> 0.05), confirming homogeneity of variances. Given the fulfillment of parametric test assumptions, structural equation modeling was deemed appropriate for further analysis. The proposed research model, along with standardized path coefficients, is as follows:
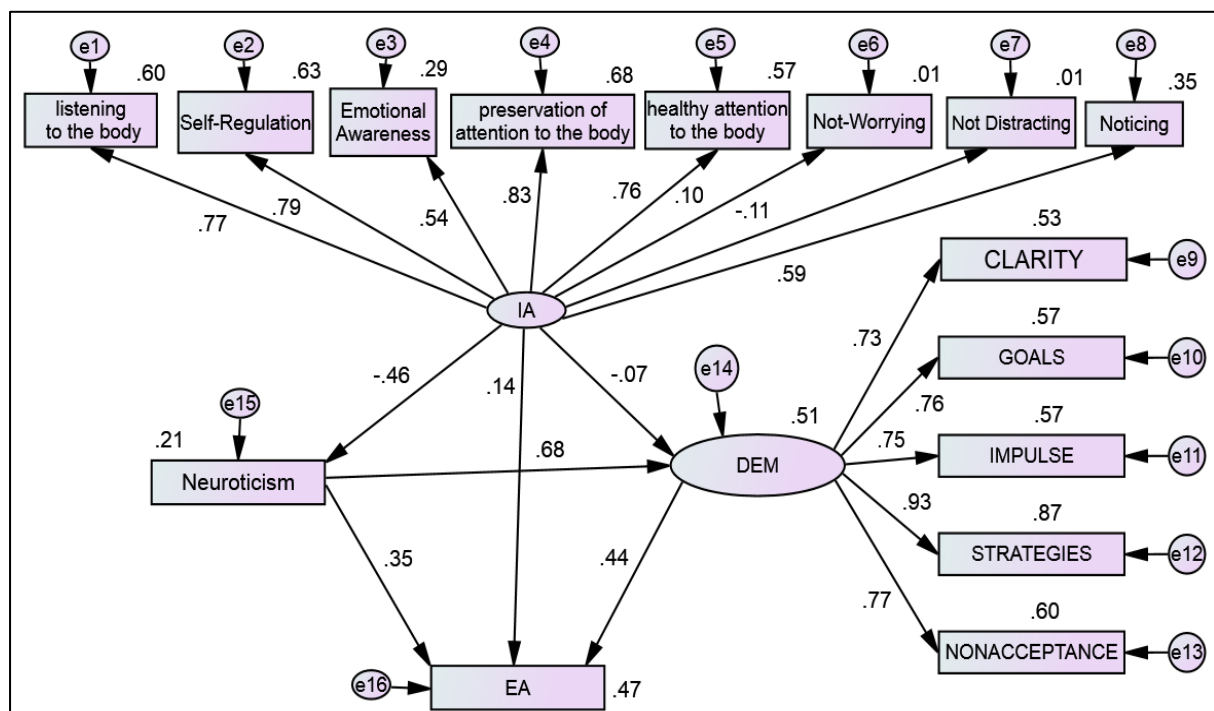

Figure1. Path model analysis output

The initially proposed model demonstrated that 47% of the variance in experiential avoidance was explained by the direct and indirect effects of the variables. The model fit indices indicated that the initial model lacked acceptable goodness-of-fit, necessitating modifications. In the first step of model refinement, as indicated by the squared multiple correlation coefficients (R^2) between each latent variable and its respective manifest indicators, both not-distracting and not-worrying exhibited R^2 values of 0.01. These fell below the threshold of 0.20 and were considered weak, suggesting high measurement error. Consequently, these variables were excluded from the analysis. In the second step, covariances were introduced between the error terms of the manifest indicators where theoretically justified. Table 3 presents the goodness-of-fit indices.

Table 3. Model fit indices

Modification indices	Acceptance range	Initial model fit indices	Model fit indicies after modification
Chi-square (x^2 or CMIN)	–	354.399	97.200
Degree of Freedom (df)	–	86	50
P-value (P)	0.05 <	0.00	0.004
(CMIN/df)	3 >	4.121	1.944
Goodness of Fit Index (GFI)	0.90 <	0.844	0.950
Adjusted Goodness of Fit Index (AGFI)	0.90 <	0.878	0.909
Root Mean Square Error of Approximation (RMSEA)	0.08 >	0.109	0/060
Root Mean Square Residual(RMR)	0.07 >	0.114	0/064
P-value of the null hypothesis for the test of close fit (PCLOSE)	0.05 <	0.00	0.173
Comparative Fit Index (CFI)	0.90 <	0.896	0/976
Incremental Fit Index (IFI)	0.90 <	0.875	0.976
Relative Fit Index (RFI)	0.90 <	0.799	0.925
Normed Fit Index (NFI)	0.90 <	0.835	0.952
Tucker-Lewis Index (TLI or NNFI)	0.90 <	0.840	0.962

As indicated in the table of goodness-of-fit indices, most values fall within the acceptable range. However, the *P*-value for the Chi-square test is less than 0.05, which suggests a lack of model fit. This discrepancy can be explained by noting that the chi-square statistic is sensitive to sample size. When applied to large samples (e.g., exceeding 200 participants), it often suggests that the model is inadequate. Consequently, it is advisable to use the Chi-square-to-degrees-of-freedom ratio (χ^2/df) instead, as this measure is less influenced by sample size. The results presented in Table 4 illustrate the direct effects between the variables. Based on these findings, the confirmation or rejection of direct effects between variables can be supported.

Table 4. Direct effects among the study variables

Independent variable	Mediator variable	Dependent variable	Unstandardized indirect effects	Lower bound	Upper bound	P	Independent variable
Interoceptive awareness	Avoidance	0.127	0.050	2.54	0.036	0.229	0.003
Interoceptive awareness	Neuroticism	-0.445	0.061	-7.29	-0.553	-0.309	0.001
Interoceptive awareness	DEM	-0.075	0.060	-1.25	-0.197	0.041	0.186
Neuroticism	DEM	0.686	0.041	16.73	0.605	0.765	0.001
Neuroticism	Avoidance	0.338	0.078	4.33	0.179	0.485	0.001
DEM	Avoidance	0.444	0.082	5.41	0.283	0.598	0.001

As demonstrated in Table 4, the magnitude of the standardized regression coefficient (Beta), indicates that larger values reflect a stronger influence of the independent variable on the dependent variable. The Critical Ratio (CR) and significance level were employed to evaluate the statistical significance of the standardized regression coefficients. A

regression path is deemed statistically significant if the absolute value of the critical ratio exceeds 1.96 and the significance level is below 0.05. For the path from interoceptive awareness to difficulty in emotion regulation, the CR was -1.25 ($P= 0.186 > 0.05$), which does not meet the threshold for statistical significance. Consequently, this non-significant regression path was excluded from the final model. Table 5 presents the indirect effects among the study variables. To assess indirect relationships, the bootstrapping method with 2,000 resamples was employed at a 95% confidence level.

Table 5. Indirect effects of the variables

Independent variable	Mediator variable	Dependent variable	Unstandardized indirect effects	Lower bound	Upper bound	P
Interoceptive awareness	Neuroticism	Difficulties in emotion regulation	-0.305	-0.395	-0.213	0.001
Interoceptive awareness	Neuroticism and difficulties in emotion regulation	Experiential avoidance	-0.319	-0.420	-0.217	0.001
Neuroticism	Difficulties in emotion regulation	Experiential avoidance	0.304	0.191	0.433	0.001

As shown in Table 5, the indirect effect of interoceptive awareness on emotion dysregulation, mediated by neuroticism, was significant ($\beta= -0.305$, $P< 0.05$). The indirect effect of neuroticism on experiential avoidance, mediated by emotion dysregulation, was significant ($\beta= 0.304$, $P< 0.05$). The serial indirect effect of interoceptive awareness on experiential avoidance through the sequential mediation of neuroticism and emotion dysregulation was significant ($\beta= -0.319$, $P< 0.05$). To quantify the contribution of each mediator in the indirect pathway from interoceptive awareness to experiential avoidance, a user-defined estimand approach with bootstrapping (2,000 resamples) was applied. Results are reported in Table 6.

Table 6. Separate indirect effects of the neuriticism and DEM

Independent variable	Mediator variable	Dependent variable	Unstandardized indirect effects	Lower bound	Upper bound	P
Interoceptive awareness	Difficulties in emotion regulation	Experiential avoidance	-0.026	-0.074	0.012	0.161
Interoceptive awareness	Neuroticism	Experiential avoidance	-0.118	-0.197	-0.061	0.001
Interoceptive awareness	Neuroticism ---------> Difficulties in emotion regulation	Experiential avoidance	-0.107	-0.176	-0.062	0.00

Table 6 reveals that the specific mediation effect of emotion dysregulation alone on the relationship between interoceptive awareness and experiential avoidance was non-significant ($\beta= -0.026$, $P> 0.05$). In contrast, the specific mediation effect of neuroticism alone was significant ($\beta= -0.118$, $P< 0.05$). Additionally, the serial mediation pathway through neuroticism $\rightarrow$ emotion dysregulation significantly contributes to the prediction of experiential avoidance from interoceptive awareness ($\beta= -0.107$, $P< 0.05$).

Discussion

The present study aimed to predict experiential avoidance based on interoceptive awareness, with neuroticism and difficulties in emotion regulation as mediators. The findings indicated that interoceptive awareness significantly and directly predicted experiential avoidance. It is hypothesized that increased awareness of bodily signals, when accompanied by interpretative biases, is perceived as a threat cue, leading individuals to engage in experiential avoidance as a strategy to reduce distress or anxiety. Paulus and Stein demonstrated that individuals with anxiety disorders who exhibit heightened sensitivity to internal cues such as heart palpitations or shortness of breath tend to avoid situations that provoke these symptoms if misinterpretations of bodily signals are present (30). Furthermore,

research on eating disorders has shown that individuals who have difficulty perceiving and responding to interoceptive signals are more influenced by their emotions and tend to engage in avoidance behaviors related to eating (31). This finding contrasts with Pérez-Peña et al. who reported that interventions based on mindfulness and enhanced body awareness significantly reduce overall experiential avoidance, behavioral avoidance, distraction, and suppression. One possible explanation is that metacognitive skills such as mindfulness, nonjudgmental acceptance, and emotion regulation training can mitigate experiential avoidance alongside increased attention to bodily signals (32).

Another key finding of this study was that neuroticism significantly and directly predicted experiential avoidance. It can be argued that due to the increased frequency and intensity of negative emotions, individuals with high neuroticism are more likely to engage in experiential avoidance. Such individuals tend to perceive environmental cues as threatening and prefer to escape or deny experiences of distress, anxiety, or other negative emotions rather than face them. Cognitively, attentional biases towards negative stimuli, rumination, catastrophizing, and negative appraisal of emotional experiences exacerbate experiential avoidance in neurotic individuals, who also have fewer cognitive resources to implement adaptive emotion regulation strategies, making experiential avoidance an effective short-term strategy. This finding aligns with Barlow and Kennedy, who found that neurotic individuals experience more negative emotions and evaluate them as unpleasant, thus resorting to experiential avoidance for emotion management, a strategy that may paradoxically increase negative emotions over time (33).

The present study also showed that difficulties in emotion regulation directly and significantly predicted experiential avoidance. This can be interpreted as individuals with greater difficulties in regulating emotions being less capable of utilizing adaptive strategies, especially when facing intense or unexpected negative emotions. Such individuals tend to resort to experiential avoidance or other maladaptive short-term coping strategies to immediately reduce distress. McHugh et al. found that limited access to emotion regulation strategies was significantly associated with increased experiential avoidance (34).

In this study, interoceptive awareness, as the independent variable, was also found to significantly and directly predict neuroticism. We argue that individuals with higher interoceptive awareness do not experience bodily sensations as threatening, alarming, or catastrophic; rather, they perceive these signals as natural and momentary information from the body. When there is trust in bodily signals and nonjudgmental acceptance, emotional reactivity decreases and emotional stability—a construct opposing neuroticism—is strengthened. These findings are consistent with Pearson and Pfeifer (9), who reported that higher scores on the Multidimensional Assessment of Interoceptive Awareness (MAIA) subscales of self-regulation, attention regulation, and trust in the body were associated with lower neuroticism, while the "noticing" subscale correlated positively with neuroticism. Training interoceptive awareness skills can enhance interoceptive accuracy and reduce neuroticism (13). However, interoceptive awareness alone did not significantly predict difficulties in emotion regulation in this study. One possible explanation is that increasing interoceptive awareness without concurrent reductions in neuroticism is insufficient to improve emotion regulation capabilities. Emotion regulation is a multidimensional process, and interoceptive awareness alone may not substantially influence it. Individuals with high emotional instability or lacking emotion regulation skills may not change their emotional reactions or effectively utilize strategies such as cognitive reappraisal despite increased interoceptive awareness. This finding aligns with Schuette et al. who found no significant association between interoceptive accuracy and emotion regulation. This can be interpreted as emotion regulation requires cognitive, emotional, and behavioral skills beyond mere perception of bodily signals (35). These results contrast with Mahler et al. who reported that interoceptive-based interventions improved emotion regulation in autistic children, as confusion regarding interoception is linked to emotion regulation difficulties (36). Tan et al. also showed that attention to interoceptive cues can enhance emotional awareness, facilitating more flexible and context-appropriate use of emotion regulation strategies. It can be argued that interoceptive interventions typically involve structured, regular exercises that increase sensitivity and accuracy toward bodily signals, foster

nonjudgmental acceptance, and improve the understanding of their relationship with internal emotions, thus effectively enhancing emotion regulation. Differences across studies may stem from conceptual and operational definitions of interoceptive awareness, interoceptive accuracy, and interoceptive-based interventions, as well as variations in assessment tools, the complexity and multidimensionality of emotion regulation, the presence of mediating or moderating variables, sample characteristics, research conditions, demographic features, and cultural-social contexts. Publication bias toward significant findings may also contribute (37).

Furthermore, neuroticism significantly predicted difficulties in emotion regulation. A plausible explanation is that individuals high in neuroticism experience frequent and intense negative emotions (e.g., anxiety, depression, anger) and emotional instability, impairing effective emotion regulation. Consistent with this, prior research has shown that neuroticism exacerbates emotion regulation problems (23,38). Neuroticism, by influencing impulsivity control—a subcomponent of emotion regulation difficulties—also affects the severity of misophonia symptoms (39). Neuroticism, by influencing emotion regulation difficulties as a mediating variable, can increase the likelihood of engaging in risky behaviors during adolescence (40).

Regarding mediation paths, the present study showed that interoceptive awareness, as the independent variable, indirectly reduced difficulties in emotion regulation through decreased neuroticism. Increased awareness of bodily states, when accompanied by trust and nonjudgmental acceptance, reduces emotional instability stemming from neuroticism, leading to less catastrophic or threatening interpretations of bodily signals and consequently more successful emotion regulation.

It was also found that neuroticism, mediated by difficulties in emotion regulation, significantly predicted experiential avoidance. This suggests that individuals with higher neuroticism use fewer adaptive emotion regulation strategies, and when experiencing negative emotions, they resort to experiential avoidance via exacerbated emotion regulation difficulties.

Interoceptive awareness, mediated by neuroticism, also significantly predicted experiential avoidance. However, mediation by difficulties in emotion regulation between interoceptive awareness and experiential avoidance was not significant. A plausible explanation is that increased interoceptive awareness reduces emotional instability and cognitive distortions in neurotic individuals, leading to less experiential avoidance. However, because interoceptive awareness alone does not substantially impact emotion regulation without other factors, mediation by emotion regulation difficulties alone is not significant.

Finally, interoceptive awareness indirectly predicted experiential avoidance significantly through serial mediation by neuroticism and difficulties in emotion regulation. Opposite directions in direct and indirect paths indicate a competitive mediation effect. The direct path from interoceptive awareness to experiential avoidance was positive, whereas the indirect path through neuroticism and emotion regulation difficulties was negative and stronger, suggesting the indirect path reduces experiential avoidance. Neuroticism and emotion regulation difficulties act as mediators that modify the magnitude and direction of interoceptive awareness's effect on experiential avoidance.

We argue that that interoceptive awareness may initially appear threatening for some individuals by heightening bodily sensitivity. However, when it leads to reduced neuroticism, emotion regulation processes are engaged, resulting in decreased experiential avoidance. In simple terms, while heightened bodily awareness may increase avoidance short-term, in the long-term, increased interoceptive awareness, through lowered neuroticism and improved emotion regulation, reduces experiential avoidance.

The non-clinical student sample limits generalizability. The cross-sectional design precludes causal or longitudinal inferences. Self-report measures risk response bias. External variables influencing key constructs were unaccounted for. Future studies should include diverse populations (e.g., clinical groups) to elucidate variable relationships across contexts. Incorporating demographic (e.g., age, gender) and sociocultural factors as mediators may uncover novel pathways. Experimental interventions targeting interoceptive awareness should assess impacts on avoidance and mediators. Integrating biological (e.g., neurochemical) and

psychosocial factors could yield comprehensive models. Longitudinal designs are needed to examine long-term effects.

Conclusion

The results suggest that therapeutic and educational interventions aiming to reduce experiential avoidance should not only enhance interoceptive awareness but also emphasize acceptance and nonjudgmental attitudes to prevent potential adverse effects of increased avoidance. Additionally, to fully leverage interoceptive awareness, treatment programs should combine its enhancement—which reduces neuroticism—with training in emotion regulation skills to reduce emotion regulation difficulties and minimize experiential avoidance. Such an integrative approach may yield more durable clinical outcomes.

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