

Yoga-Based Somatic Avatar Training for Alexithymia: Improving Distress Tolerance in College Students

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Abstract

Introduction

The difficulty of identifying and describing feelings (alexithymia) has been associated with problematic coping strategies (e.g. drinking) in college students. Expanding on prior work, the present study explored whether a novel two-week Somatic Avatar (SA) training would improve emotion regulation in college students and if the effect differed between students with varied levels of alexithymia.

Method

Sixteen college students ($M_{\text{age}} = 22.88$; 81% non-Hispanic White) completed a two-week protocol that entailed four days of yoga training paired with three days of processing an individualized and animated avatar of their yoga practice. Participants completed demographic questions, the Multidimensional Assessment of Interoceptive Awareness scale (MAIA-2), and the Toronto Alexithymia Scale – 20 (TAS – 20) at baseline. They also completed baseline and exit assessments of the Distress Tolerance Scale (DTS). Median split groupings fell naturally in the moderate and high ranges of the TAS-20.

Findings

After controlling for interoception, a mixed-model analysis of covariance (ANCOVA) showed a significant effect of alexithymia on distress tolerance change scores from pre- to post- SA training, with participants endorsing moderate alexithymia ($p = .006$) demonstrating greater improvement in distress tolerance than participants with high alexithymia ($p = .589$), $F(1, 13) = 6.346$, $p = .026$, partial $\eta^2 = .328$.

Discussion

Results suggested that the novel SA training may improve distress tolerance in those who struggle to identify their emotions. Future research should experimentally manipulate the length of training and increase the sample size to assess the effects of training among individuals with high alexithymia.

Introduction

Mental health among university students has been worsening, with 33% and

37% of students experiencing moderate to severe anxiety or depressive symptoms in the United States (Healthy Minds Network, 2025). Rigorous academic environments and juggling various responsibilities can exacerbate students' stress levels, especially since the onset of the COVID-19 pandemic (Clabaugh et al., 2021; Son et al., 2020). To handle acute stressors, emotional regulation is a key mechanism for students' personal and academic functioning (Alacha et al., 2025; Finkelstein-Fox et al., 2018; Romo et al., 2025). When weakened or not utilized, it can lead to worsening mental health problems and increase the likelihood of psychopathologies, bridging the gap from nonclinical levels to clinical diagnoses (Anestis et al., 2013; Kaiser et al., 2012; O'Cleirigh et al., 2007; Robinson et al., 2021). Maladaptive coping strategies, like binge drinking or drug use, become more probable in high-stress or troubling emotional states, perpetuating a cycle of worsening mental health (Aurora & Klanecky, 2016; Kenne et al., 2017; Organ et al., 2016). Amidst the mental health crisis in Western universities, students may turn to these coping strategies rather than seek out healthier methods due to stigma or outside pressures (Eisenberg et al., 2009). Therefore, it is vital to provide these students with the tools necessary to manage their emotions before their mental or physical health declines from nonclinical to clinical levels.

Emotion regulation is heavily intertwined with the ability to identify and describe emotions. A framework that highlights this important interaction is the *attention-appraisal model of alexithymia* (D. Preece et al., 2017), which expands upon the *extended process model of emotion regulation theory's* situation-attention-appraisal-response sequence (Gross, 2015). In this framework, an emotion sets the stage through a particular situation. The individual then diverts their attention to that situation, appraises it based on what it means for them, and finally initiates a reaction. By combining the work of these prominent theories of emotion regulation, Preece's (2017) attention-appraisal model conceptualizes emotion identification deficits as a set of difficulties during the attention and appraisal stages of emotion, which are determined by an individual's emotional schema (ability deficit) or avoidance as a regulation strategy (avoidance alexithymia). The model validates that individuals with emotion regulation difficulties are also less able to attend to negative feelings and are typically seen with greater mental health than those without, due to an "undifferentiated structure" rather than the "absence" of alexithymic affect (D. Preece et al., 2017). Additionally, the framework describes that targeted practices aimed at recognizing emotional responses should be implemented to foster greater emotional awareness and improve functioning among individuals with these difficulties suggests implementing targeted practices to recognize emotional responses to foster greater emotional awareness and improve functioning, and it should be used with individuals with these difficulties to help them.

Having an internal lack of emotional awareness or difficulty regulating emotions is often linked with problematic coping strategies that are typical within a collegiate environment, such as excessive or risky drinking (Alpay et al., 2024). In addition to putting collegiate students at risk for developing substance-abusing behaviors, potentially leading to substance use disorders, the inability to identify one's emotional state could put individuals at greater risk for developing clinical levels of depression and anxiety. These emotional deficits, named alexithymia, can also impair an individual's ability to identify and describe their emotions (Hamdan et al., 2024; D. A. Preece et al., 2023; Rahimi et al., 2025). Along with having a predisposition for clinical diagnoses, individuals with alexithymia also have a lower threshold for handling stressful situations (Leyro et al., 2010). Distress tolerance refers to an individual's inability to tolerate unpleasant internal states (Leyro et al., 2010; Zvolensky et al., 2010). Having a greater amount of alexithymia can put an individual at risk

for reduced distress tolerance (Henschel et al., 2021). In collegiate populations, depression and anxiety are key factors that are associated with greater experienced alexithymia (Darvishi et al., 2025). Additionally, college students with diminished capacity to endure hardship may have greater difficulty in acknowledging how they feel in these situations, leading to risky decision-making (Panno et al., 2019).

Although many universities have established mental health services to address students' needs, therapeutic interventions that specifically incorporate guided movement to probe calming responses are limited in the university space. Without treatment or guided introspection into one's emotional states for calming, interoceptive responses, developing various psychopathologies can become more probable. Psychological interventions like dialectical behavior therapy have been shown to indirectly improve emotional regulation outcomes (Zeifman et al., 2020), but little work has identified targeted treatment to improve distress tolerance for individuals displaying alexithymia. College students may be more apt to participate in accessible therapy formats that encourage mindfulness, such as yoga practice. Yoga incorporates deliberate movement, inner reflection, and mind-stilling, which has emotion regulation benefits beyond completing physical movements (Gard et al., 2014). It has been shown to improve distress tolerance in adolescent and adult populations (Medina et al., 2015a). Yoga practice has been implemented in a variety of clinical and therapeutic settings and, most relevant to this study, has shown success in reducing stress, anxiety, and depression symptoms in college students (Falsafi, 2016). While yoga could be flexibly implemented at a relatively low cost, college students are notoriously stretched thin due to their chosen academic programs and involvements, which could leave little time to participate in practices like yoga (Czyz et al., 2013; Nash et al., 2017). While yoga remains a staple for many, individuals may seek digitized treatments that incorporate movement and mindfulness as the world becomes increasingly technology-focused (Silveira et al., 2023). To date, literature has not examined the effects of yoga practice intertwined with digital self-observational training in individuals with alexithymia and distress tolerance.

In the current study, we employed a training that utilized yoga practice and a Somatic Avatar (SA) training (Wang et al., 2024). This SA training was developed with a focus on emotions and interoceptive processing of three-dimensional (3D) self-representations of each participant practicing various yoga poses. Each representation displays a participant's projection of their physical characteristics, expressions, and movements throughout the session. The training can strengthen the link between physical and emotional states by watching themselves complete calming movements, promoting semantic recall of yoga's calming effect. Through active recall of self-observation by watching the avatar complete the yoga poses already accomplished by the participant, semantic memories of the experiences and emotions through these poses can be rehearsed. The process of self-regulation through emotional processing via observation is consistent through yoga poses (Wang et al., 2024) and digital learning (Ge, 2025). The foundational study that first used this SA training demonstrated a significant effect of SA on improving distress tolerance in unhoused individuals recovering from substance use disorders, as well as support for SA improving distress tolerance among those with less severe alexithymia (Wang et al., 2024).

The effect of SA training has yet to be examined in a student population, accounting for the role of alexithymia. Moreover, little is known about whether increasing the dose of yoga and SA training from a single day to over multiple days improves emotion regulation. The present study builds on prior work (Wang et al., 2024) by testing emotion regulation improvement as a function of a two-week SA training among students with varying levels of alexithymia. We expect that the two-week SA training will proportionally improve students' ability to tolerate distress with the greatest improvements among the students with more severe alexithymia.

Method

Participants

Seventeen participants were recruited from a university using flyers and a digital survey. The final sample included sixteen participants, as one did not complete the exit portion of the training and therefore was not included in the analyses. Individuals who showed interest in the study were screened for eligibility by trained research staff using the following criteria: 1) were 19 years of age or older, 2) able to read, write, and understand English fluently, 3) comfortable using a computer if given a tutorial, 4) able to participate in low to moderate physical activity. Participants who met eligibility criteria completed all training, yoga sessions, and received monetary compensation for their participation. The current study was approved by the institutional review board of a large public university. Data were collected in the spring of 2024.

Table 1 summarizes participant demographic information. Participants had a mean age of 22.87 years ($SD = 3.07$) and were mostly female ($N = 12$). Most participants were non-Hispanic White (81.25%). Most students were actively pursuing an undergraduate degree (37.5%) or a graduate degree (31.25%). Only two participants were married or living with someone (12.5%). There were no significant differences between alexithymia groups across demographic variables.

Procedure

The primary aim of incorporating SA with yoga practice was to strengthen the mind-body connection during movements that facilitate emotion identification. Individuals participated in a non-consecutive two-cohort training program that occurred over two weeks. The first week consisted of an intake session and the first yoga session on a Monday, with the following Wednesday consisting of the second yoga session. In the second week, participants completed yoga session three and the avatar creation session on a Monday, the first avatar processing session on Wednesday, followed by the final avatar processing session and exit session on Friday. All participants were screened for eligibility and consented to the study.

In week one, participants completed and were familiarized with an Emotion Awareness Questionnaire (EAQ) that prompts the assessment of mindfulness states as they complete the yoga, as well as a Movement Questionnaire (MQ) that assesses range of motion concerns. A certified yoga instructor educated all participants on each yoga pose, paired with breathing exercises meant to enhance a mindful state. Careful instruction was maintained throughout the sessions for participants' adequate understanding of each movement and to ensure no injury occurred. The focus was to ensure a fully embodied emotional

experience. After each session, participants completed a pre- and post-yoga EAQ and MQ. In the second week after the third yoga session, participants' movements were recorded for 30 seconds using an iPad.

On the Monday of week two, after completing the training sessions, each participant created their SA, a digital representation of themselves, on an online character creation platform (Ready Player Me; Ready Player Me, Pärnu, Republic of Estonia). They were instructed to design an SA that represented their bodily and emotional features by choosing the sex, face shape, features, hair, clothing, and accessories of the avatar. The avatar creation stage served as an opportunity to create one's somatic representation of their bodily and emotional states. Each participant's yoga movement video clip was then paired with their SA using a motion capture system (DeepMotion's animate 3D; DeepMotion, San Mateo, United States). The final product was a 30–60 second video of the avatar performing the yoga movements of each participant.

For the first avatar processing session, participants were introduced to their video and instructed to embody the movements in the video to reengage with the emotions present during that time. Pre- and post-EAQs were completed with each processing session to track participants' emotional changes. The second processing session, completed on the following Friday, was completed in a group setting. Throughout these sessions, the embodiment of the movements and emotions experienced was continually prompted. Finally, participants completed an exit session with the same questionnaires present at intake to assess changes in distress tolerance and interoception. All surveys and questionnaires were administered on Qualtrics.

Instruments

Participants completed a demographic survey and reported their age, gender, ethnicity, education, marital status, drugs of choice, any previous care for emotional/psychiatric problems, family history of mental health, medications, and previous experience with yoga practice.

The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) was administered at baseline and post-training to assess each participant's perceived capacity to withstand stress. There were a total of 15 items rated on a 5-point Likert scale (1 = Strongly disagree, 5 = Strongly agree). There were four subscales, and a total score was computed as the mean of the four subscales (range = 1–5) and used in the final analyses. Higher scores on the DTS demonstrated a lower level of distress tolerance. The DTS has been utilized in literature for both health and clinical populations.

Alexithymia was measured at baseline using the Toronto Alexithymia Scale (TAS; Bagby, Parker, & Taylor, 1994). Participants completed 20 self-report questions to rate their ability to identify and describe their emotions on a 5-point Likert scale (1 = Strongly disagree, 5 = Strongly Agree). A higher total score (range = 20–100) indicated more clinical or severe levels of alexithymia. Participants were split based on being higher or lower than the median score (63.44) across all students at intake. The TAS-20 has demonstrated good internal consistency and test-retest reliability (Bagby, Parker, & Taylor, 1994).

The Multidimensional Assessment of Interoceptive Awareness version 2 (MAIA-2; Mehling et al., 2018) consists of 37 questions using a 5-point Likert scale (0 = Never, 5 = Always) to measure how aware a participant is of body sensations and feelings. At baseline, participants rated how much they experienced each type of scenario demonstrated in the scale. Total scores were summed and used for the analysis (range = 0–185), with scores below 10% and above 90% indicating clinical significance. Higher scores on the scale indicated more awareness of bodily sensations. MAIA-2 has improved internal consistency of MAIA (Mehling et al., 2018).

Statistical analyses

Analyses were conducted using IBM SPSS Statistics (Version 29). As this study is an extension of a pilot study with the same procedure, no formal power or sample size calculation was conducted. Mean and standard deviation (SD) were used to describe continuous variables, and frequency and percentage were used to describe categorical variables. Median split groupings were conducted, and all participants fell naturally in moderate to high ranges of alexithymia on the TAS. The mean score across participants was 63, with the high range of TAS being a total score of 61 to 100. Participants' scores in the moderate group ranged from 49 to 62, and scores in the high group were 64 to 76. To ensure the training improved distress tolerance across groups, we conducted paired-samples *t*-tests without accounting for covariates. This analysis aimed to show that the effect of yoga training on distress tolerance improvement was significant, regardless of group.

Mixed-model analysis of covariance (ANCOVA) was used to test the effect of SA on distress tolerance between individuals with moderate or high levels of alexithymia, controlling for interoceptive awareness. All analyses were performed at the significance level of $p = 0.05$. Partial η^2 were used to quantify effect sizes. Interoceptive awareness was controlled for in this study to account for any significant bodily awareness participants might already have. Previous literature has found that individuals who avidly practice yoga may already have strong interoceptive awareness and be more likely to have stronger emotion regulation skills (Füstös et al., 2013).

Findings

Effect of Somatic Avatar Training on Distress Tolerance

Table 2 summarizes the results of a mixed-model ANCOVA testing the effect of SA on the change in distress tolerance from pre- to post- intervention, controlling for interoceptive awareness. Compared to participants in the high TAS group, those in the moderate TAS group significantly improved in DTS Total score from baseline to post-intervention, as demonstrated by the significant time x group interaction, $F(1, 13) = 6.346, p = .026$, partial $\eta^2 = .328$. Post hoc analyses showed a significant improvement in DTS Total score (i.e., greater total score from baseline) for the moderate TAS group ($p = .006$) but not the high

TAS group ($p = .589$), suggesting that SA had a stronger effect in improving overall distress tolerance on students with moderate alexithymia than students with high alexithymia (Fig. 1).

Subgroup Analyses on Distress Tolerance Change in Moderate vs High Alexithymia

Paired-samples t -tests were conducted for each TAS group to further explore whether individuals with moderate or high alexithymia benefited separately from the intervention, meaning improved distress tolerance totals. The High ($n = 8$) and Moderate ($n = 8$) groups did not differ in baseline demographic characteristics. Tests showed that individuals in the Moderate TAS group significantly improved in DTS total from pre- to post-intervention ($p = .030$). The High TAS group showed no significant change in DTS Total (Table 3).

Discussion

University students are faced with constant pressures of high academic performance and daily stressors of their various programs. Alongside this, they may be more at risk for worsening mental health if facing alexithymia and have low distress tolerance. Thus, interventions that target emotion regulation skills using accessible, quick resources could be highly used amongst this population. This explorational feasibility study is the second of its kind, utilizing a novel SA training paired with yoga practice to encourage mind-body connection and emotion regulation skills. As hypothesized, the change in distress tolerance significantly improved after the training, and this change was greater in the moderate alexithymia participant group compared to the high alexithymia group. SA was more effective for participants with moderate alexithymia at baseline.

We found a significant main effect of SA in improving DTS, which is in line with previous literature identifying positive effects of yoga on distress tolerance skills over time (Medina et al., 2015b) and using a novel SA training (Wang et al., 2024). The current study was also in alignment with the attention-appraisal model of alexithymia (Preece et al., 2017), such that individuals who have alexithymia are not devoid of the ability to recognize emotions but may lack the necessary tools to remain emotionally stable, and thus an intervention could be helpful. Consistent with Wang et al (2024), who found a significant effect of SA in individuals with less severe alexithymia, this same effect was observed in the present study. Therefore, SA training may provide substantial emotion regulation benefits to those who are moderately experiencing alexithymia by utilizing mind-body practices like yoga training. However, the latter recruited individuals from a substance use disorder recovery facility and compared groups based on SA training versus a control group that was shown emotion regulation skill videos. While this study found similar effects, a control group was not utilized, with the focus being on the change in distress tolerance after intervention between moderate and high alexithymia groups at baseline. Utilizing customizable avatars could add another layer of personalization to the individual's experience, offering another avenue for emotional connection with one's bodily sensations.

The present results provide evidence that SA paired with yoga training has a higher effect amongst students with moderate alexithymia than with higher alexithymia. Preece et al. (2017) conceptualize alexithymia as a combination of emotional identity deficits and avoidance defenses that affect one's ability to identify their emotions. Additionally, they state within their model that avoidant alexithymia may increase as a state reaction to stress (Preece et al., 2017). Hypothetically, those with moderate alexithymia could be more apt to respond to mind-body trainings that require inner reflection than individuals with high alexithymia, who could be more emotionally guarded and find the practice difficult. The SA training did not have as great an effect on the DTS change score for individuals with high alexithymia in this group. In theory, a longer training protocol, including more training sessions and avatar processing sessions, could yield a greater change in distress tolerance for individuals with high alexithymia. Medina et al. (2015) utilized an eight-week, twice-weekly protocol amongst a clinical sample versus controls and found greater increases in distress tolerance amongst the yoga group. Unlike Medina, the present work was conducted over the course of two weeks, thus replication is needed to examine a longer effect. As this is an exploratory study with a small sample size, results should be interpreted with caution.

The following results can inform clinical and community work that involves digital intervention, mind-body practice, and building emotion regulation skills. First, SA paired with yoga practice could be a feasible method for developing emotion regulation strategies for students with moderate alexithymia. Future studies should extend this study by recruiting a larger sample size and perhaps study populations that have clinical diagnoses, like anxiety or depression. It is also worth exploring if there are differences within each subgroup of individuals with alexithymia. For example, whether there would still be a significant effect of SA on distress tolerance within a larger group of students with high alexithymia after the same protocol. Second, future studies could replicate the protocol using longer yoga sessions and extending the avatar processing periods. Emotion regulation interventions targeting distress tolerance in individuals with alexithymia could be conducted over the course of months, which could provide more strength to the argument that SA is an effective treatment for distress tolerance. Third, more research is needed to examine qualitatively how participants respond to SA, and how their embodiment experiences could affect distress tolerance. Having a holistic understanding of the data could better inform future SA research in community samples. Finally, future research should aim to address the holistic nature of semantic priming as it relates to alexithymia, as there is no single measure that accounts for this.

Limitations

The current study has few notable limitations. First, the study should be interpreted with caution due to its small sample size and heterogeneous sample of primarily non-Hispanic white adults. Due to the small sample, we are unable to correct for multiple comparisons, which could have potentially introduced bias into the results. The sample was primarily female, while males typically display more alexithymia (Levant et al., 2009). Thus, it is necessary to replicate these findings using a larger, more diverse sample that is more representative of the general population. Second, participants were only administered questionnaires for alexithymia and distress tolerance at baseline and after the intervention. It would be informative to know how each of these construct's changes over time. Third, this study is the second to test the feasibility of SA paired with yoga practice. It is difficult to know if the improvement in distress tolerance is directly related to the yoga itself, the creation and viewing of the avatar, or the combination of both, as hypothesized. This is a future question that could be answered with further replication.

Conclusions

The pilot study also addresses a concern related to the accessibility of SA in real-life applications (Wang et al., 2024). The same idea applies here, as implementing the protocol in casual, accessible environments would be the goal for future studies. In fact, a mobile phone version would make SA even more accessible to students who could potentially use it on their own time for emotion regulation skill-building (which is being developed by the research team). By implementing these changes and future directions, SA paired with yoga could very well be a staple of support for individuals with alexithymia struggling with low distress tolerance. In conclusion, the current feasibility study found preliminary evidence for the effect of SA in improving distress tolerance amongst university students with moderate and high levels of alexithymia. Within this sample, students with moderate alexithymia showed a greater change in distress tolerance from baseline to post- SA training. The current findings should be replicated on a larger scale and with a diverse sample. Future research is necessary to clarify the exact mechanisms of SA and its application clinically within a university setting.

Declarations

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Author Contributions: ER cleaned the data, collaborated on statistical analysis, and wrote the manuscript. AO, WW, and DM conceived, designed, and coordinated the study. WW contributed to finalizing the statistical analyses. AO taught the yoga classes. DM contributed to revision and overall supervision. All authors reviewed and approved the manuscript.

Ethics Approval: The study received ethics approval from the University of Nebraska–Lincoln Institutional Review Board (approval number 20240423221FB).

Consent to Participate: All participants provided written informed consent to participate. Participation was voluntary.

Consent for Publication: Not applicable.

Data Availability: Because the study collected private mental health information, the data cannot be shared openly. Further information may be requested from the corresponding author, subject to applicable ethical and institutional requirements.

References

1. Alacha HF, Walbridge FC, Harton HC, Vasko JM, Bodalski EA, Rother Y, Lefler EK (2025) Cognitive emotion regulation and learning effectiveness in college students with ADHD symptoms. *Anxiety Stress Coping* 38(1):73–89. <https://doi.org/10.1080/10615806.2024.2379986>
2. Alpay P, Kocsel N, Galambos A, Kökönyei G (2024) The relationship between alexithymia, rumination and binge drinking among university students. *Pers Indiv Differ* 223:112621. <https://doi.org/10.1016/j.paid.2024.112621>
3. Anestis MD, Pennings SM, Lavender JM, Tull MT, Gratz KL (2013) Low distress tolerance as an indirect risk factor for suicidal behavior: Considering the explanatory role of non-suicidal self-injury. *Compr Psychiatr* 54(7):996–1002. <https://doi.org/10.1016/j.comppsy.2013.04.005>
4. Aurora P, Klanecky AK (2016) Drinking motives mediate emotion regulation difficulties and problem drinking in college students. *Am J Drug Alcohol Abuse* 42(3):341–350. <https://doi.org/10.3109/00952990.2015.1133633>
5. Clabaugh A, Duque JF, Fields LJ (2021) Academic Stress and Emotional Well-Being in United States College Students Following Onset of the COVID-19 Pandemic. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.628787>
6. Czyz EK, Horwitz AG, Eisenberg D, Kramer A, King CA (2013) Self-reported Barriers to Professional Help Seeking Among College Students at Elevated Risk for Suicide. *J Am Coll Health* 61(7):398–406. <https://doi.org/10.1080/07448481.2013.820731>
7. Darvishi A, Almani N, Zarimeidani F, Rahmati R, Shahraki R, H (2025) The Silent Burden: Understanding Alexithymia and Its Correlation With University Student Depression, Anxiety, and Stress in a Cross-Sectional Study. *Health Sci Rep* 8(9):e70677. <https://doi.org/10.1002/hsr2.70677>
8. Eisenberg D, Downs MF, Golberstein E, Zivin K (2009) Stigma and Help Seeking for Mental Health Among College Students. *Med Care Res Rev* 66(5):522–541. <https://doi.org/10.1177/1077558709335173>
9. Falsafi N (2016) A Randomized Controlled Trial of Mindfulness Versus Yoga: Effects on Depression and/or Anxiety in College Students. *J Am Psychiatr Nurses Assoc* 22(6):483–497. <https://doi.org/10.1177/1078390316663307>
10. Finkelstein-Fox L, Park CL, Riley KE (2018) Mindfulness and emotion regulation: Promoting well-being during the transition to college. *Anxiety Stress Coping* 31(6):639–653. <https://doi.org/10.1080/10615806.2018.1518635>
11. Füstös J, Gramann K, Herbert BM, Pollatos O (2013) On the embodiment of emotion regulation: Interoceptive awareness facilitates reappraisal. *Soc Cognit Affect Neurosci* 8(8):911–917. <https://doi.org/10.1093/scan/nss089>
12. Gard T, Noggle JJ, Park CL, Vago DR, Wilson A (2014) Potential self-regulatory mechanisms of yoga for psychological health. *Frontiers in Human Neuroscience*, 8. <https://doi.org/10.3389/fnhum.2014.00770>

13. Ge D (2025) Resilience and online learning emotional engagement among college students in the digital age: A perspective based on self-regulated learning theory. *BMC Psychol* 13(1):326. <https://doi.org/10.1186/s40359-025-02631-1>
14. Gross JJ (2015) The Extended Process Model of Emotion Regulation: Elaborations, Applications, and Future Directions. *Psychol Inq* 26(1):130–137. <https://doi.org/10.1080/1047840X.2015.989751>
15. Hamdan HM, Alislimah G, Alshalawi H, Alharbi K, Alsaif MI, Sulimany AM (2024) Prevalence of Alexithymia and Associated Factors Among Dental Students in Saudi Arabia: A Cross-Sectional Study. *Healthcare* 12(21). <https://doi.org/10.3390/healthcare12212193>
16. Healthy Minds Network (2025) *2024–2025 Healthy Minds Study: National data report* https://healthymindsnetwork.org/wp-content/uploads/2025/09/2024-2025_HMS-National-Data-Report_Student.pdf
17. Kaiser AJ, Milich R, Lynam DR, Charnigo RJ (2012) Negative Urgency, Distress Tolerance, and substance abuse among college students. *Addict Behav* 37(10):1075–1083. <https://doi.org/10.1016/j.addbeh.2012.04.017>
18. Kenne DR, Hamilton K, Birmingham L, Oglesby WH, Fischbein RL, Delahanty DL (2017) Perceptions of Harm and Reasons for Misuse of Prescription Opioid Drugs and Reasons for Not Seeking Treatment for Physical or Emotional Pain Among a Sample of College Students. *Subst Use Misuse* 52(1):92–99. <https://doi.org/10.1080/10826084.2016.1222619>
19. Leyro TM, Zvolensky MJ, Bernstein A (2010) Distress Tolerance and Psychopathological Symptoms and Disorders: A Review of the Empirical Literature among Adults. *Psychol Bull* 136(4):576–600. <https://doi.org/10.1037/a0019712>
20. Medina J, Hopkins L, Powers M, Baird SO, Smits J (2015a) The Effects of a Hatha Yoga Intervention on Facets of Distress Tolerance. *Cogn Behav Ther* 44(4):288–300. <https://doi.org/10.1080/16506073.2015.1028433>
21. Medina J, Hopkins L, Powers M, Baird SO, Smits J (2015b) The Effects of a Hatha Yoga Intervention on Facets of Distress Tolerance. *Cogn Behav Ther* 44(4):288–300. <https://doi.org/10.1080/16506073.2015.1028433>
22. Nash S, Sixbey M, An S, Puig A (2017) University students' perceived need for mental health services: A study of variables related to not seeking help. *Psychol Serv* 14(4):502–512. <https://doi.org/10.1037/ser0000172>
23. O'Cleirigh C, Ironson G, Smits JAJ (2007) Does Distress Tolerance Moderate the Impact of Major Life Events on Psychosocial Variables and Behaviors Important in the Management of HIV? *Behav Ther* 38(3):314–323. <https://doi.org/10.1016/j.beth.2006.11.001>
24. Organ JM, Jaffe DB, Bender KM (2016) Suffering in Silence: The Survey of Law Student Well-Being and the Reluctance of Law Students to Seek Help for Substance Use and Mental Health Concerns. *J Legal Educ* 66(1):116–156
25. Panno A, Sarrionandia A, Lauriola M, Giacomantonio M (2019) Alexithymia and risk preferences: Predicting risk behaviour across decision domains. *Int J Psychol* 54(4):468–477. <https://doi.org/10.1002/ijop.12479>
26. Preece DA, Mehta A, Petrova K, Sikka P, Bjureberg J, Becerra R, Gross JJ (2023) Alexithymia and emotion regulation. *J Affect Disord* 324:232–238. <https://doi.org/10.1016/j.jad.2022.12.065>
27. Preece D, Becerra R, Allan A, Robinson K, Dandy J (2017) Establishing the theoretical components of alexithymia via factor analysis: Introduction and validation of the attention-appraisal model of alexithymia. *Pers Individ Differ* 119:341–352. <https://doi.org/10.1016/j.paid.2017.08.003>
28. Rahimi M, Zarimeidani F, Bahreini HS, Rahmati R, Shahraki R, H (2025) Personality traits and alexithymia: A closer look at university students in a cross-sectional study. *Medicine* 104(10):e41765. <https://doi.org/10.1097/MD.00000000000041765>
29. Robinson M, Ross J, Fletcher S, Burns CR, Lagdon S, Armour C (2021) The Mediating Role of Distress Tolerance in the Relationship Between Childhood Maltreatment and Mental Health Outcomes Among University Students. *J Interpers Violence* 36(15–16):7249–7273. <https://doi.org/10.1177/0886260519835002>
30. Romo J, Pérez JC, Cumsille P, Hollenstein T, Olaya-Torres A, Rodríguez-Rivas ME, Melero J (2025) Emotion Regulation Strategies and Academic Achievement among Secondary and University Students: A Systematic Review and Meta-Analysis. *Educational Psychol Rev* 37(3):80. <https://doi.org/10.1007/s10648-025-10054-y>
31. Silveira S, Godara M, Faschinger A, Singer T (2023) Reducing alexithymia and increasing interoceptive awareness: A randomized controlled trial comparing mindfulness with dyadic socio-emotional app-based practice. *J Affect Disord* 341:162–169. <https://doi.org/10.1016/j.jad.2023.08.093>
32. Son C, Hegde S, Smith A, Wang X, Sasangohar F (2020) Effects of COVID-19 on College Students' Mental Health in the United States: Interview Survey Study. *J Med Internet Res* 22(9):e21279. <https://doi.org/10.2196/21279>
33. Wang W, Henson A, Ondrusek AR, Tisato M, Kaufman R, Barrett A, Elowsky J, McChargue DE (2024) Effect of a Novel Somatic Avatar Training on Distress Tolerance Among Unhoused Men Recovering from Substance use Disorders: A Pilot Study. *J Technol Behav Sci* 10(2):353–363. <https://doi.org/10.1007/s41347-024-00435-5>
34. Woodyard C (2011) Exploring the therapeutic effects of yoga and its ability to increase quality of life. *Int J Yoga* 4(2):49–54. <https://doi.org/10.4103/0973-6131.85485>
35. Zeifman RJ, Boritz T, Barnhart R, Labrish C, McMain SF (2020) The independent roles of mindfulness and distress tolerance in treatment outcomes in dialectical behavior therapy skills training. *Personality Disorders: Theory Res Treat* 11(3):181–190. <https://doi.org/10.1037/per0000368>
36. Zvolensky MJ, Vujanovic AA, Bernstein A, Leyro T (2010) Distress Tolerance: Theory, Measurement, and Relations to Psychopathology. *Curr Dir Psychol Sci* 19(6):406–410. <https://doi.org/10.1177/0963721410388642>

Tables

Table I. Participant characteristics at baseline (n = 16)

	Moderate (n = 8)	High (n = 8)	p
Age (m, SD)	22.63 (2.97)	23.13 (3.36)	0.757
Gender (n, %)			1
Male	1 (6.3)	1 (6.3)	
Female	6 (37.5)	6 (37.5)	
Non-binary	1 (6.3)	1 (6.3)	
Ethnicity (n, %)			0.215
Non-Hispanic white	7 (43.75)	6	
Asian/Pacific Islander	1 (6.3)	0	
Multi- Ethnic	0	2 (12.5)	
Education (n, %)			0.639
Some college	3 (18.8)	3 (18.8)	
Bachelor's degree	1 (6.3)	0	
Some graduate school	2 (12.5)	3 (18.8)	
Master's degree	1 (6.3)	2 (12.5)	
Professional or Doctoral degree	1 (6.3)	0	
Marital status (n, %)			1
Married/Living with someone	1 (6.3)	1 (6.3)	
Never married	7 (43.75)	7 (43.75)	
Treatment for emotional/psychiatric problems (n, %)			0.055
Yes	5 (31.3)	8 (50)	
No	3 (18.8)	0	
Family history of emotional/psychiatric problems (n, %)			0.721
N/A	2 (12.5)	1 (6.3)	
First degree relatives	5 (31.3)	5 (31.3)	
Second degree relatives	1 (6.3)	1 (6.3)	
Third degree relatives	0	1 (6.3)	
Taken yoga/meditation classes taken this week (n, %)			0.131
Yes	0	2 (12.5)	
No	6 (37.5)	6 (37.5)	
DTS Total (m, SD)	33.5 (6.35)	51.38 (5.07)	<.001

Note. Means, SD, and percentage of demographic information are described for each group. Significant differences between groups were tested with independent-samples t-tests, and the significance is described.

Table II. Results of mixed-model ANCOVA testing between-group differences in changes in distress tolerance total and subscale scores from baseline to p

Measure	Moderate Alexithymia (n = 8)		High Alexithymia (n = 8)		F (1, 13)	p	partial η ²
	Baseline	Post-intervention	Baseline	Post-intervention			
DTS Total	33.5 (6.35)	37.63 (6.93)	51.38 (5.07)	50.88 (5.46)	6.35	0.026*	0.328
Mean (standard deviation)							

*p < .05

Table III. Results of paired *t*-tests on changes in distress tolerance from baseline to post-intervention in somatic avatar participants with moderate or high

Measure	Baseline	Post-intervention	<i>t</i>	<i>df</i>	<i>p</i>	Hedges' <i>g</i>	DTS change (M)
Moderate TAS (TAS < 63)	37.63 (6.93)	33.50 (6.35)	2.72 (4.29)	7	0.03*	4.831	4.13
High TAS (TAS > 63)	51.38 (5.07)	50.88 (5.46)	-.798 (1.77)	7	0.45	1.996	-.50

Mean (standard deviation)

**p* < .05

Figures

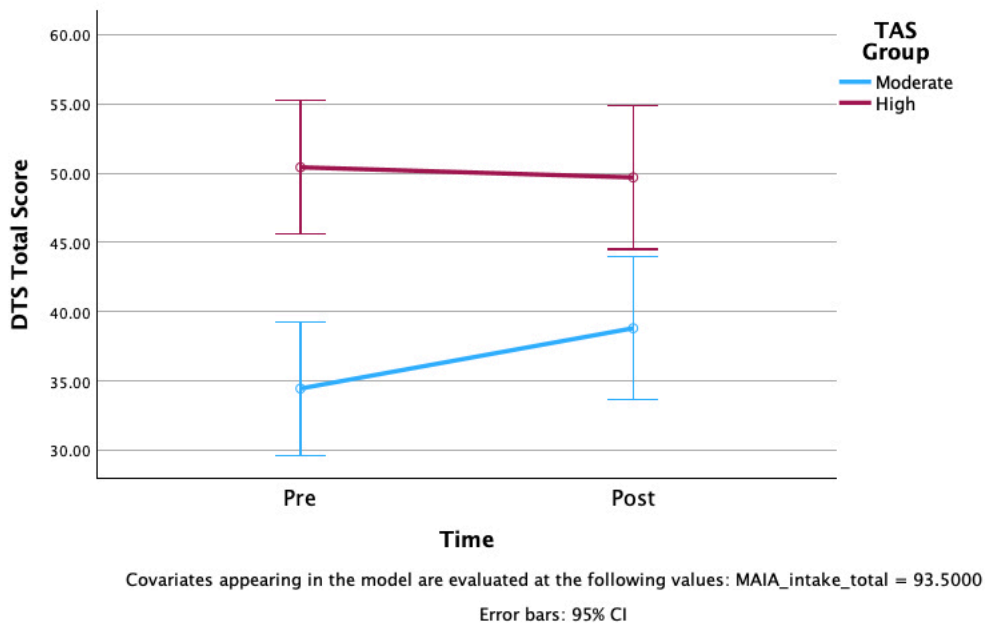


Figure 1

Means and standard deviations of distress tolerance scores in moderate and high alexithymia groups, pre- and post- SA training.

Note. The plot shows the change in distress tolerance from pre- to post-intervention for each TAS group. Those with moderate TAS at baseline demonstrated a significant change in distress tolerance ($p = .006$) compared to those with high TAS at baseline ($p = .589$).