Original Research Article

Online Mindset Training for Prelicensure Nursing Students: A Randomized Longitudinal Study

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Abstract

Introduction: Research suggests students with a growth mindset are more successful. Utilizing Dweck's growth mindset model, the study explored the benefits of mindset training within nursing education.

Objective: To determine the impact of an online mindset training intervention on first-semester prelicensure nursing students' mindset beliefs and learning and studying strategies.

Methods: This study employed a randomized longitudinal design, conducted entirely online. Sixty-eight participants completed all phases of the study. Data were collected using the Williams Inventory of Learning Strategies tool before and after participants viewed an online training.

Results: Findings indicate that online mindset training positively influenced student learning, reducing fear of failure and increasing willingness to remediate.

Conclusion: These results highlight the promising impact of an online learning approach in fostering a growth mindset among nursing students; suggesting the potential for integrating mindset training into the nursing curriculum to enhance student success, with recommendations for further research in larger-scale studies.

Keywords

nursing education, educational achievement, learning, teaching methods, nursing students, mindset training

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Introduction

Prelicensure nursing education is challenging, and many students struggle to be successful. Innovative teaching and learning strategies are vital for student success. The growth mindset model, first described by Dweck (2016), has been embraced by many postsecondary schools to cultivate a growth mindset (Sahagun et al., 2021).

The growth mindset model is linked with improved academic outcomes in health professions (Williams & Lewis, 2021). However, insufficient evidence demonstrates its value in nursing education. Additionally, a review of the literature demonstrates that the limited studies of mindset training in nursing students have used face-to-face classroom training, which is impractical for large numbers of students (Lewis et al., 2020, 2022). This study sought to determine if an online mindset training video presented to first-semester prelicensure nursing students would demonstrate increased growth mindset attitudes and evidence-based learning, in comparison to a control group.

Review of Literature

Psychologist Dweck's (2016) mindset model provides a framework through which researchers can perceive attributes of student learning. According to Dweck, individuals tend to hold one of two mindsets: a fixed mindset or a growth

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mindset. Growth mindset learners tend to achieve more because they seek challenges and opportunities for learning, while fixed mindset learners tend to avoid challenges due to fear of failure and belief that their abilities are fixed.

A growth mindset is based on a belief that abilities and intelligence can be developed through dedication, hard work, and learning. Challenges are seen as opportunities to learn and improve, and effort as the path to mastery. Individuals with a growth mindset are more likely to persist when faced with failure, seeing setbacks as an opportunity to grow and improve, and constructive criticism as valuable (Dweck, 2016).

In contrast, fixed mindset learners believe that abilities and intelligence are fixed traits, inherent and unchangeable. They tend to avoid challenges for fear that failure will demonstrate their lack of ability. Fixed mindset learners may not exert as much effort, because they believe that needing to work hard reveals their lack of ability. Failure, and even constructive criticism, are seen as judgments on their personal, intrinsic abilities (Dweck, 2016).

In the academic setting, fixed mindset learners focus on successful performance goals, such as grades, and are motivated by fear of failure and the desire to always appear intelligent and competent. As a result, fixed mindset learners are less likely to remediate (Dweck, 2016). Growth mindset learners focus on the goal of mastery learning, often using failure as an opportunity to improve (Dweck et al., 2014).

Mindset training has been used with students in primary, secondary, and postsecondary education and has demonstrated a positive impact on academic outcomes (Yeager et al., 2016). The growth mindset model has been studied in health professions education (Williams & Lewis, 2021; Wolcott et al., 2021) but is limited in nursing.

Three nursing student studies, conducted in a face-to-face environment, have shown promise by cultivating a growth mindset (Lewis et al., 2020, 2022; Williams, 2021). One study assessed 151 nursing students for mindsets and learning and study strategies, finding that students with more growth mindset tendencies engaged in more evidence-based learning and study strategies (Williams, 2021). The other two studies included mindset training: a study of 35 associate degree nursing students (Lewis et al., 2020) and a study of 46 Bachelor of Science nursing students (Lewis et al., 2022). These intervention studies demonstrated small to moderate effects of the mindset training, with more benefit seen in the associate degree nursing student population.

Large studies and meta-analyses of mindset training for general student populations have provided information on the value of online mindset training, especially for underrepresented or minoritized students (MacNamara & Burgoyne, 2022; Yeager et al., 2016). These studies suggest that there is potential benefit of mindset training on student academic achievement, though large sample sizes have been required to demonstrate this benefit (Yeager et al., 2016).

This study sought to determine if an online mindset training intervention would help first-semester prelicensure nursing students to endorse more growth mindset beliefs and use more effective, evidence-based learning and study strategies. The research question was: Does an online mindset training intervention help nursing students to endorse more growth mindset beliefs and report the use of more effective, evidence-based learning and study strategies?

Methods

Design

This study used a randomized longitudinal design consisting of an online educational intervention and pre- and postintervention collection of data using a survey tool. Participants were randomized to receive either the experimental intervention, an online mindset training, or the control intervention, an online neuroanatomy and physiology training. This design was selected to replicate prior online studies of mindset training interventions (Burnette et al., 2023).

A power analysis was conducted to estimate the needed sample size. Independent-samples t-tests assessing differences in pre-post Williams Inventory of Learning Strategies (WILS) scores by intervention group in a prior study were used to calculate sample size. In a previous study of the mindset intervention, an effect size of .24 was obtained when examining pre-post changes in the Mindset Assessment WILS subscale (Lewis et al., 2020). To detect an effect size of this magnitude with 80% power, for a two-tailed t-test with an alpha level of .05, it was calculated that a total of 546 participants (274 in the control group and 274 in the experimental group) would need to complete the pre and post assessments.

Procedure. The duration of the study was approximately three months. Participants were invited to take part in the study by an email, forwarded from their nursing program director. The email contained a link to an online survey tool (Qualtrics©). The participant first completed the consent process and provided information to determine if they met the inclusion and exclusion criteria. If the participant met the criteria, they then completed the preintervention WILS tool.

After completing the preintervention WILS tool, the participant was instructed to check their email for a link to the online training. The link to the online training was sent by the investigator after randomizing the participant to the control or intervention group based on a permuted block randomization schedule. The permuted block randomization schedule was used to ensure that participants from associate degree and bachelor's degree programs were evenly represented. The participant demonstrated their completion of the online training by answering a quiz in Qualtrics© after the training.

The investigator emailed the participants two months later to request the completion of a postintervention WILS tool via another link to the online survey tool. Reminder emails were sent approximately two weeks later.

Instrument. The WILS tool is a 33-item visual analog scale survey tool, which includes four subscales: Mindset Assessment, Willingness to Remediate and Review, Avoidance and Fear of Failure, and Learning Strategies (Williams, 2021). The WILS tool has been tested for reliability and validity in nursing students, with test–retest reliability of $\alpha = .844$. The four subscales were tested separately for reliability. The Mindset Assessment had an alpha coefficient of 0.94–0.98 (Dweck et al., 1995). The Willingness to Remediate and Review was 0.806, the Fear of Failure was 0.714, and the Learning Strategies was 0.824 (Lewis et al., 2020). A reliability coefficient of greater than 0.70 is considered a reliable instrument (LoBiondo-Wood & Haber, 2021). Content validity of the WILS tool was established through a literature search and consultation with a group of expert nurse educator faculty (LoBiondo-Wood & Haber, 2021). Reliability and validity testing of the WILS tool was conducted in a face-to-face setting, though subsequent use in studies has been in an electronic survey format (Lewis et al., 2020, 2022). The WILS tool was chosen for this study because it was the instrument used in studies of Associate Degree and Bachelor of Science nursing students receiving a mindset training intervention (Lewis et al., 2020, 2022).

The four subscales are scored separately and collectively. Summated mindset scores range from 0 to 300, with lower scores indicative of the growth mindset and higher scores attributed to the fixed mindset learner. In addition, learning strategy and remediation scores are deemed more effective as the subscale scores increase. Lastly, a learner exhibits less fear of failure as the scores diminish.

Intervention. The intervention was an online video adaptation of an in-person mindset training created and delivered by the researchers for two prior studies (Lewis et al., 2020, 2022). The prior studies provide in-person mindset training to prelicensure nursing students—one study in associate degree students, and the other in bachelor's degree students. The original training was based on the literature, including content that other researchers had included in mindset training (Yeager et al., 2016). The online training consisted of an interactive presentation that included a mindset self-assessment quiz, information about the neuroplasticity of the brain, stories of famous people who succeeded after failure, and behaviors of growth mindset students. The total time for the online training was 20 min. A quiz at the end, consisting of one question, allowed researchers to confirm that participants viewed the entire presentation. The question was an open-text response asking "Considering the information that you learned in the video, please use the text box below to write a short (less than 500 words) letter to a future nursing student, giving them advice for being successful in nursing school. Consider including suggestions for how they might study, and how they might overcome a setback, such as a failing exam grade."

Control. The control group received online training focused on neuroanatomy and physiology, which was 20 min in duration. This training included a quiz at the end, consisting of the same question asked of the experimental group, to allow researchers to confirm that the participants viewed the entire presentation. The decision to include a control group with a control intervention was based on prior research (MacNamara & Burgoyne, 2022) and with the goal of having a baseline with which to compare the experimental group.

Sample

The setting for the study was the first semester of the prelicensure nursing program in nursing schools across the United States. The study was conducted entirely online. First-semester nursing students from schools across the U.S. were invited to participate in the study. Initial recruitment was accomplished by an email sent to administrators of all U.S. nursing programs that had publicly available contact information ($n = 1{,}975$). Administrators were asked to forward the email inviting study participation to the first-semester nursing students; the researchers sent reminder emails to the administrators approximately two weeks later. The administrators of the nursing programs were not involved with the data collection or other study activities; they only served to allow the researchers' access to the population of nursing students for recruitment.

Inclusion/Exclusion Criteria

The inclusion criteria were: first-semester nursing student, fluent in English, willing to complete online training module and pre- and post-training survey. Exclusion criteria were non-nursing students, nursing students not in their first semester of the nursing program, or not fluent in English.

Ethical Considerations

The study was deemed exempt by the institutional review board (IRB) of the first author's institution (Pro00109925). Further IRB approval or exemption was received from 15 additional institutions that required local approval before offering participation to their students.

Participants completed the consent process in the online survey. The initial screen in the survey provided consent information and instructed the participant that choosing "Yes" after the statement "I agree to participate in this study" comprised their consent (Appendix A). Participants were also notified in the recruitment email that, if they completed all portions of the study, they had the opportunity to be entered into a random drawing for a $100 gift card.

The random drawing was accomplished through a separate survey that was not connected to the data collection. If participants wished to be entered in the drawing, they

followed a link to that separate survey. Members of the research team who were not involved in the data collection selected the winner of the drawing and distributed the gift card electronically.

Data Collection and Analysis

Recruitment and Data Collection. The researchers recruited participants by emailing deans and directors of nursing programs in the U.S. Lists of approved nursing programs were obtained from the websites of boards of nursing in all 50 states and the District of Columbia. The researchers searched for the email addresses of the deans and directors of the schools by viewing nursing education accreditation agency listings and school websites. This list was compiled in August 2022. We found 2,363 programs, and 1,975 (84%) had dean/director name and contact information available. In some cases, the same dean/director supervised multiple programs. In many other cases, especially for private and for-profit institutions, information was not available.

In September 2022, a recruitment email was sent to 1,975 deans or directors. Approximately 7% were returned with no forwarding address ($n = 143$). Fifty-seven responded that they were retired or on sabbatical and gave another name and email address, to whom we sent the recruitment email. Twenty requested additional information for their school IRB, which we provided. A reminder was sent to the list of emails one week later. The response rate could not be calculated, as the number of students who received the survey request is unknown.

The study was conducted via email and online survey software (Qualtrics©). A total of 734 potential participants followed the link from the email to the first survey, and 460 of those completed the survey, including giving consent to participate and providing their contact information for follow-up. The remaining potential participants did not qualify for participation due to not meeting the inclusion criteria or not completing the survey.

The 460 participants who were enrolled in the study were randomized using a permuted block randomization schedule and were sent an email with a link to either the control or experimental training video. Just over 50% ($n = 233$) followed the link to the training video. As a result, there were 131 participants in the experimental group and 102 in the control group.

Data Analysis. Data were analyzed using IBM SPSS Statistics (Version 27), guided by a data analysis plan formed in consultation with a professional statistician. Descriptive statistics were conducted to summarize participant characteristics, including demographics and academic risk factors. To determine if the online mindset intervention was associated with mindset beliefs and evidence-based learning strategies, we compared the intervention and control group on change from pre to post in WILS subscale scores, using independent-samples t-tests. The initial intent was to determine if nursing students at academic risk benefit more from mindset training, by using a linear regression model, in which WILS change scores would be regressed on the interaction between intervention group and academic risk factors. However, the final sample of participants was not large enough to permit this testing.

Results

The study experienced significant attrition, with only 68 participants, 36 from the control group and 32 from the intervention group, completing both the pre and postintervention WILS. Details are shown in the CONSORT diagram (Figure 1).

Sample Characteristics

Participants were primarily from associate degree or bachelor's degree nursing programs, and the majority were female. In effort to identify subgroups who may receive greater benefit from mindset training, we asked if participants identified as being from culturally or linguistically diverse backgrounds, and if they had ever repeated a course in school. Chi-square testing showed that there was not a significant difference between the experimental and control groups considering the variables of program type, gender, age, status as a culturally or linguistically diverse learner, or having previously failed and repeated a course ($P > .05$) (Table 1). The acceptable level for statistical significance was chosen at $P > .05$ (LoBiondo-Wood & Haber, 2021).

Research Question Results

The preintervention WILS scores were similar in the control and experimental groups. On the Learning Mindset subscale, both groups scored on the low end of the score range indicating growth mindset. Both groups also demonstrated moderate scores on the Learning Strategies, Willingness to Remediate, and Fear of Failure subscales. In the analysis of postintervention WILS scores, both groups scored in the moderate range on Willingness to Remediate, with a more pronounced change in the experimental group, though this change was not statistically significant. The experimental group also demonstrated a decrease in their Fear of Failure subscale postintervention. Figures 2 and 3 visually demonstrate the experimental and control group scores.

The researchers compared the pre and postintervention WILS (Table 2). All subscales' reliability scores were acceptable: ranging from $\alpha = .763–.769$ (LoBiondo-Wood & Haber, 2021). Paired-sample *t*-tests revealed only one item had statistical significance ($P < .05$); the Fear of Failure subscale score in the intervention group decreased 57 points ($P = .034$). Although not statistically significant, a promising finding was the Willingness to Remediate subscale score in the intervention group increased by 35 points ($P = .237$).

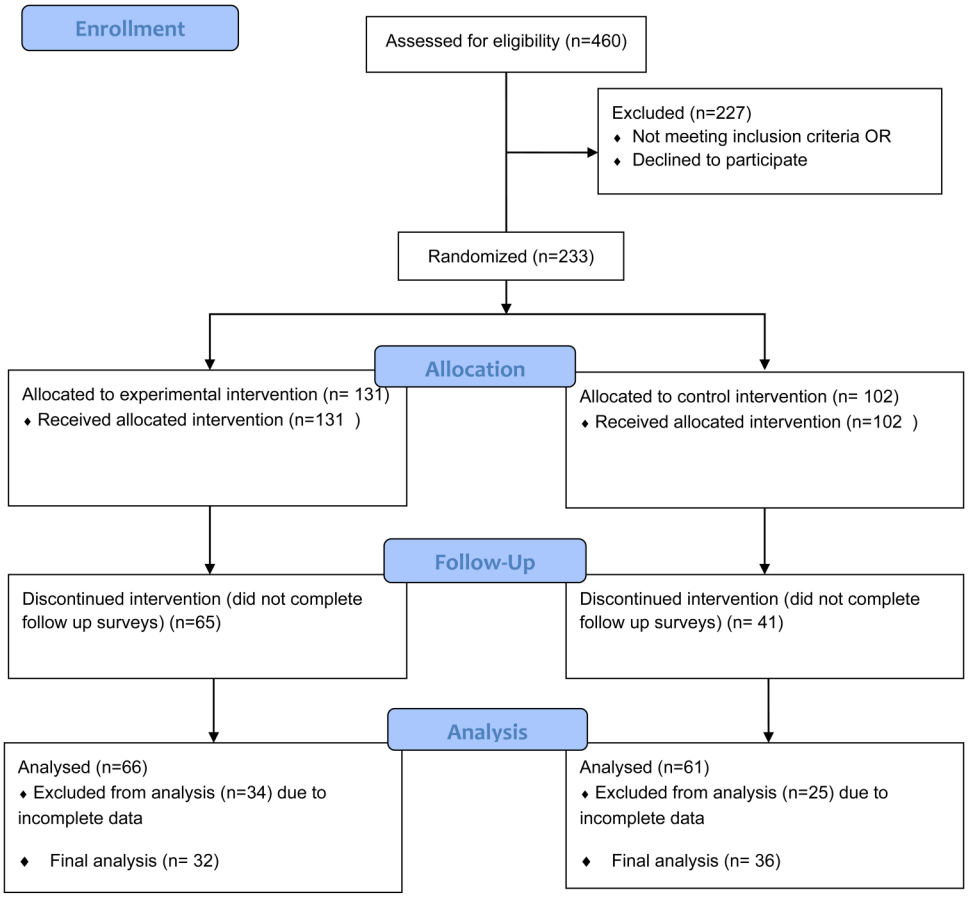

Figure 1. CONSORT diagram.

Mindset scores in both groups did not change significantly. There was no significant difference in the control group. There were no appreciable differences between associate degree and bachelor degree participants. The small sample size precluded correlations with demographics.

Discussion

The research question for this study was: Does an online mindset training intervention help first-semester nursing students to endorse more growth mindset beliefs and use more effective, evidence-based learning and studying strategies? The results of the study only partially support online mindset training for this purpose. Considering the high attrition rate in this online longitudinal study, future mindset studies may experience an improved level of participation if offered in an in-person setting. However, while the study's small sample limits generalizability, the fact that positive influences in learning were evident from a distanced learning approach is promising.

This was the first randomized interventional mindset study conducted within nursing education examining mindsets in nursing students. The online growth mindset intervention positively influenced student learning. There was a statistically significant finding with decreased Fear of Failure scores. This finding is significant as students who fear failing experience feelings that they will not be able to achieve their goals, which may lead to exerting less effort toward reaching a goal due to an overwhelming desire to avoid feelings of disappointment or embarrassment. Also, students who fear failing may spend mental energy keeping up an appearance of success rather than taking the necessary steps to succeed, which in turn can sabotage their achievement. On the other hand, students who have less fear of failing are more apt to seek out difficult challenges and understand that failure can be a part of their academic journey to success. Students who are willing to face failure have higher levels of academic tenacity, defined as working harder and smarter over a long period of time. Students who are not afraid to fail can experience a setback and then use that setback to learn and grow so that future setbacks can be overcome creating a pattern of long-term success (Dweck et al., 2014).

While not statistically significant, the respondents in this study demonstrated more willingness to remediate following the intervention. More willingness to remediate is practically significant and worthy of discussion. According to Hanners and Melnyck (2020), statistical significance does not equate

Table 1. Demographics of Experimental and Control Groups.

		Experimental group, $N = 32$		Control group, $N = 36$		
		N	%	*N*	%	Significance
Type of nursing program	Associate degree	18	56	27	75	0.62
	Bachelor of Science (BSN)	8	25	9	25	
	Diploma	1	3	0	0	
	Accelerated BSN	5	16	0	0	
Identify as culturally or linguistically diverse?	Yes	5	16	6	17	0.91
	No	27	84	30	83	
Repeated a course?	Yes	4	13	4	11	0.86
	No	28	87	32	89	
Gender	Male	3	9	6	17	0.38
	Female	29	91	30	83	
Age	25 years or younger	15	47	18	50	0.80
	Older than 25 years	17	53	18	50	

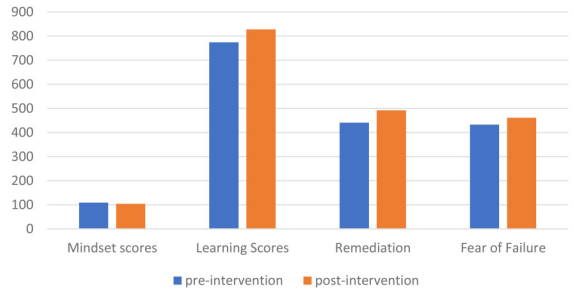

Figure 2. Control group results.

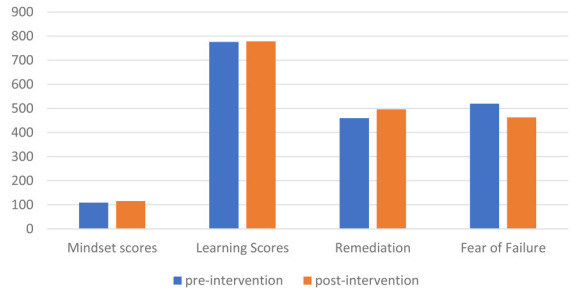

Figure 3. Experimental group results.

to human significance. The clinician's approach to critically appraising research evidence should consider the study's nature, context, and rigor (p.409). "The highly controlled 'gold standard' randomized controlled trial (RCT) study may only show part (e.g., physical outcomes) of the full clinical picture because of the context of the research" (Hanners & Melnyck, 2020, p. 409). The context of this study is student learning. Theoretically, it is known that learners with growth mindsets are more apt to remediate than those with fixed mindsets (Dweck, 2016). The fact that the students in this randomized study were more willing to remediate after

Table 2. WILS Scores Before and After Training Intervention.

	Learning mindset	Learning strategies	Remediation	Fear of failure
Control	Pre:109 Post:104 $P = .612$	Pre:774 Post:828 $P = .018$*	Pre:441 Post:492 $P = .109$	Pre: 433 Post: 461 $P = .489$
Experimental	Pre:109 Post: 116 $P = .620$	Pre:776 Post: 778 $P = .931$	Pre:460 Post: 496 $P = .237$	Pre:520 Post: 463 $P = .034$*

a growth mindset intervention was an intended outcome. Students demonstrating a willingness to remediate have an intrinsic motivation to improve and work to overcome educational gaps or weaknesses. Therefore, the human significance of student learning may not only be found in statistical significance.

The online intervention positively influenced student learning, in the aspects of less fear of failure and more willingness to remediate. These findings were consistent with earlier face-to-face interventions (Lewis et al., 2020, 2022). Prior studies using a mindset training intervention with pre- and postintervention WILS measurement were conducted in person, with the intervention incorporated into academic activities such as student orientation (Lewis et al., 2020, 2022). These studies had a much lower incidence of attrition. Longitudinal research studies in higher education typically experience very high attrition rates, and it is difficult to reliably predict consistent participation (DaLomba et al., 2021). The researchers speculate that participant engagement may be increased with a study design that includes mindset training in a required activity, that is, part of the curriculum. Busy nursing students may not prioritize activities that are not required for their schooling, or incorporated into school activities.

Strengths and Limitations

A strength of the study was the use of web-based survey software and an online intervention to include participants from diverse geographic locations in the U.S., and from multiple prelicensure program types. The effectiveness of this study design suggests that a similar process can be used for future studies, providing an economical and convenient method.

The timing of the study may have been a limitation. Invitations to participate were sent to students in September 2022, which would be at the beginning of the semester in many schools. For first-semester nursing students, this could be a time of adjustment and feeling overwhelmed, leading them to have little interest in optional activities like participating in a research study. The postintervention survey was sent in late November, which may have been a time that students were busy preparing for final exams.

We did not collect data about details of the nursing programs such as accelerated, hybrid, or other factors. These factors could have played a role in students' willingness to participate in the study.

The study's power analysis recommended 546 participants; therefore, the small sample is a limitation. Nursing students may have low participation in research studies due to academic workload, lack of time, or disinterest in the subject matter (Burrell et al., 2020). Using an incentive such as the drawing for a gift card has varied results; some researchers report increased responses with an incentive, while others note no change in response rate (Wu et al., 2022).

Implications for Practice

This study provides limited additional evidence to support the use of a mindset training intervention to promote nursing student success. Although this longitudinal study experienced significant attrition, the use of an online process for data collection and for providing the intervention was effective. Given the minimal time and expense necessary to provide mindset training, and the potential benefit, nurse educators may consider offering an online mindset training to their nursing students such as the free, evidence-based "Growth Mindset for College Students" program (Project for Education Research That Scales (PERTS), 2023).

Conclusion

Mindset training, primarily face-to-face, is promising for nursing student success. This study has demonstrated some success with a distance online mindset training approach. Both processes are simple and inexpensive to coordinate and may have long-term influences on fear of failure and remediation. A more extensive multisite study utilizing the mindset training video embedded within the nursing curriculum, in a face-to-face setting to mitigate attrition, and with dedicated time to complete the pre- and post-surveys may yield more promising results.

Declaration of Conflicting Interests

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Supplemental Material

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