

Graduate Student Journal of Psychology



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Letter from the Editors:

We are delighted to present Volume 22 of the Graduate Student Journal of Psychology, a testament to our enduring commitment to showcasing rigorous and impactful research that advances our understanding of psychological phenomena. This volume curates a diverse array of studies that tackle the pressing and multifaceted psychological challenges of our time.

Within these pages, you will find insightful explorations into the psychological impacts of genetic testing for Alzheimer's Disease, the effects of loneliness and coping strategies during the COVID-19 pandemic, the impact of psychological variables on performance in statistics courses, the long-term effects of trauma on veterans, the factors influencing attitudes towards mental health treatment among Asian international students in the United States, and the innovative approaches in reducing Anti-Gay prejudice. Each study offers valuable insights into these complex psychological issues and contributes significantly to the broader field of psychology.

We extend our sincere gratitude to our contributing authors, peer reviewers, and dedicated editorial board, whose unwavering efforts have made this publication a reality. We are also deeply grateful to our faculty sponsor, Dr. Matt Blanchard, for his invaluable guidance and support. Special recognition is due to Daniella Ekstein, our former Chief Editor, whose vision and dedication have significantly shaped the journal. Her leadership was pivotal in upholding the journal's standards of excellence and academic integrity.

As we continue to bridge the gap between academic research and societal application, we invite our readers to engage with us, share insights, and contribute to the ongoing dialogue about these critical issues at gsjp@tc.columbia.edu or through our social media channels.

Thank you for your support and interest in our work. We are excited to embark on this journey through complex psychological landscapes together with our esteemed readership.

Warm Regards,

The Editors - Xi Pan, Catherine Shorb, Ellen Somers, Evelyn Tsai, Emma Langsford, & Yutong Zhu



Resilience and Psychological Distress in Genetic Testing for Alzheimer's Disease

Alicia Burgei

Department of Psychology, Tiffin University

The relationship between resilience and psychological distress resulting from genetic testing for Alzheimer's disease among non-cognitively impaired individuals is examined in this study. Preventative genetic testing determines the likelihood of developing or passing on genetic disorders. However, receiving genetic information, especially regarding incurable diseases like Alzheimer's disease, can lead to significant psychological distress. Resilience, the ability to cope with adversity and recover quickly, is considered a protective factor against psychological distress. The purpose of this study is to investigate whether higher levels of resilience are associated with lower psychological distress from genetic testing for Alzheimer's disease and to determine if having a familial history of Alzheimer's disease influences this relationship. An online cross-sectional survey was conducted among 181 non-cognitively impaired participants (43.6% Male; 54.1% Female; $M_{age} = 38.1$ [13.9]) using the Impact of Genetic Testing for Alzheimer's Disease (IGT-AD) scale and the Brief Resilience Scale (BRS), along with a question about family history of Alzheimer's disease. The results indicated a significant negative correlation between resilience and psychological distress, suggesting that individuals with higher resilience experienced lower distress related to genetic testing. However, family history did not mediate the relationship, meaning the protective effect of resilience was consistent regardless of familial risk. These findings have implications for developing targeted support services and resilience-based interventions to help individuals cope with the emotional impact of genetic testing for Alzheimer's disease. Further research could explore other potential protective factors and examine the long-term impact of genetic testing results on psychological well-being and behavior.

Keywords: resilience, psychological distress, genetic testing, Alzheimer's disease

The landscape of preventative genetic testing is continuously expanding, providing insights into the likelihood of developing or transmitting genetic disorders. This form of testing holds apparent significance: offering the advantage of foreknowledge about genetic diseases prior to the manifestation of symptoms, facilitating the diagnosis of various conditions, and receiving information pertaining to the potential transmission of genetic disorders to offspring (Khoury et al., 2006). Within Alzheimer's disease and related dementias, a focal point of investigation lies in genetic testing. Advanced technology is now available to analyze genetic makeup, facilitating the identification of specific genes associated with the onset of Alzheimer's disease. Consequently, some individuals are interested in procuring their genetic results (Cutler & Hodgson, 2003). As genetic testing advances and refines, its accessibility is anticipated to expand, granting individuals the choice of accessing information about their susceptibility to Alzheimer's disease and related dementias. Ethical considerations stemming from the acquisition of potential symptomatology knowledge encompass issues of hereditary transmission, lifestyle adjustments, and future life planning (Roberts et al., 2003).

Alongside the benefits of genetic testing, there are potential ramifications for those who opt to acquire genetic information, notably an increase in psychological distress. Psychological distress is characterized by a spectrum of stress-related symptoms encompassing

anxiety, tension, and depression, significantly impacting overall well-being (Gooding et al., 2006). In the context of discovering that one is a carrier of an Alzheimer's disease gene, individuals may commonly be confronted with uncertainties regarding the timing and potential outcomes of their condition, thus intensifying psychological distress (Galluzzi et al., 2022). Given that Alzheimer's disease and related dementias involve irreversible brain degeneration and lack definitive curative treatments, the absence of viable long-term remedies could lead to distress among individuals experiencing cognitive impairment or a dementia diagnosis (Cutler & Hodgson, 2003). Therefore, receiving genetic information about Alzheimer's disease has the potential to induce substantial psychological distress (Bookheimer & Burggren, 2009).

Moreover, chronic stress has been shown to exert a detrimental impact on Alzheimer's disease itself. Research suggests that sustained stress can accelerate the progression of Alzheimer's disease, leading to increased neurodegeneration and the worsening of cognitive and behavioral symptoms in affected individuals (Justice, 2018). This complex interplay between stress and Alzheimer's disease underscores the need for comprehensive interventions aimed at addressing both the psychological well-being of patients and the biological factors contributing to disease progression.

Though the psychological impact of receiving a diagnosis for an incurable disease is apparent, the do-

main of potentially protective factors remains less explored. Resilience is a pivotal protective factor against psychological distress (Garmezy, 1991). Resilience, characterized by the ability to withstand or recover quickly from distress, has an established inverse correlation with psychological distress (Yasien et al., 2016). Norman Garmezy introduced the resilience theory to understand how individuals who face adversities and risk exposure can develop normally and become healthy adults (Garmezy, 1991). This theory postulates that resilience entails rebounding from emotional distress and maintaining adaptive behavior despite threats and adversities to an individual's well-being.

Resilience has been shown to impact the adjustment to genetic testing results with hereditary diseases, including cancers (Ho et al., 2010). Psychological distress from genetic testing is impacted by the severity of the disease, perceived risk, ability to control the disease, and availability of treatments (Oliveri et al., 2018). Analogous to cancer, Alzheimer's disease significantly affects quality of life and psychosocial well-being and often necessitates long-term care or interventions (Oliveri et al., 2018). Hence, further exploration is required to unravel the interplay between resilience and psychological distress from genetic testing, particularly in Alzheimer's disease.

Moreover, the influence of resilience on psychological distress may not be uniform across all individuals. Family history, which signifies whether an individual has a familial predisposition to Alzheimer's disease, has the potential to influence this relationship. A family history of a disease, particularly one with a genetic component like Alzheimer's disease, can significantly heighten psychological distress (Liu & Cao, 2014). It leads to increased awareness of one's susceptibility, fostering stress and anxiety, as individuals become more concerned about their own risk and the possibility of transmitting the condition to their descendants (Roberts et al., 2003). Furthermore, family history can impose a perceived genetic "inheritance burden" on individuals, leading to guilt and concern about implications for their loved ones or future generations (James et al., 2006). While family history can increase the risk of developing Alzheimer's disease (Liu & Cao, 2014), its role in the context of resilience and psychological distress remains underexplored.

An understanding of the psychological impact of genetic testing, particularly in the Alzheimer's context,

is beneficial in identifying individuals at heightened risk of psychological distress and in devising additional coping strategies (Chung et al., 2009). Resilience-based interventions aimed at strengthening an individual's resilience, thereby mitigating distress, and at promoting emotional well-being hold the potential to significantly enhance the quality of life for individuals afflicted by neurocognitive disorders. However, more information is needed to understand how to effectively introduce resilience interventions (Wang et al., 2021), specifically in the context of receiving genetic testing results.

Purpose

The purpose of this study is to examine the relationship between resilience and psychological distress from genetic testing for Alzheimer's disease among non-cognitively impaired individuals, hereafter referred to as 'unimpaired.' Drawing from resilience theory, which posits that protective factors mitigate the adverse consequences of risk exposure (Garmezy, 1992), it is hypothesized that individuals with higher levels of resilience will experience lower levels of psychological distress when considering genetic testing for Alzheimer's disease. This association rests on the premise that individuals exhibiting higher resilience levels will experience lower levels of emotional and behavioral challenges, such as depression, anxiety, and stress (Yasien et al., 2016), compared to their counterparts with lower resilience levels.

Furthermore, family history is hypothesized to mediate the interplay between resilience and psychological distress. Instances of psychological distress, including anxiety, depression, and disease-specific distress, tend to intensify in the presence of a family history of particular diseases (Liu & Cao, 2014). Family history is projected to influence the strength of the relationship of resilience as a positive adaptation to psychological distress, given that a familial history of Alzheimer's disease is likely to amplify the psychological distress experienced by participants contemplating genetic testing for the disease. The intent of the study is to answer two key research questions:

1. Do variations in the Impact of Genetic Testing for Alzheimer's Disease (IGT-AD) scores relate to levels of resilience among unimpaired participants?
2. Does the presence of a family history of Alzheimer's disease influence or mediate this relationship?

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This study aims to recruit participants to complete a survey consisting of the IGT-AD survey, Brief Resilience Scale, and a query regarding a family history of Alzheimer's disease. The IGT-AD (Appendix 1) was created to evaluate the nature of genetic information and examine the impact of Alzheimer's disease risk assessment (Chung et al., 2009). The survey will measure the adverse effects of participants receiving genetic information about Alzheimer's disease. The Brief Resilience Scale (Appendix 2) will assess the perceived ability to bounce back or recover from stress (Smith et al., 2008). The variables, psychological distress from Alzheimer's disease genetic testing and resilience, will be assessed for a relationship and will determine if family history impacts the relationship. The findings hold significant implications for discerning susceptibility to psychological distress related to genetic testing and understanding the role of resilience in counteracting these psychological effects.

Method

Participant Recruitment and Selection

To address the research question, a cross-sectional survey was conducted online, leveraging the benefits of prompt participant data collection without the need for in-person administration, which aligns with the study's focus on obtaining a snapshot of characteristics at a specific moment. This research project underwent rigorous ethical review and received Institutional Review Board (IRB) approval from Tiffin University, ensuring the protection and well-being of all participants involved. Prior to involvement in the study, participants were required to complete an informed consent which provided comprehensive information about the research objectives, procedures, potential risks, benefits, and confidentiality measures.

Due to the convenience of online data collection, the internet survey platform, Prolific, was used for participant recruitment, with the study population of interest being cognitively unimpaired individuals. The survey obtained a study sample of participants who are not cognitively impaired or experiencing memory concerns through exclusion criteria. Participants who answered "yes" to the initial question regarding memory concerns and cognitive impairment: "Are you currently experiencing cognitive impairment or concerns with your memory and thinking?", were disqualified from the study. The survey

was a convenience sample as the Prolific platform fills study places on a first-come, first-served basis and was distributed to all available participants. Participants were pre-screened for English as their primary language, and an inclusion criterion was implemented to obtain participants only from the United States.

Sample Size Determination

A power analysis was conducted using G*Power to determine the appropriate sample size for the expected statistical analyses. For multiple regression ($f^2=.15$, 80% power, $\alpha=.05$) a minimum sample size of 82 and 68 participants, respectively, is required to yield meaningful results. The study aimed to recruit approximately 200 eligible participants to complete the survey, accounting for the number of participants deemed ineligible due to the initial question regarding memory concerns or cognitive impairment and their incomplete survey completion. A total of 231 participants initiated involvement in the study, and 50 participants were disqualified from the study due to the inclusion criteria. The sample size consisted of 181 responses with an average survey completion time of three minutes. Participants who completed the entirety of the survey were rewarded \$0.40 as an appreciation of their time and effort.

Participant Demographics

A total of 251 participants were presented with the survey, 181 met the inclusion criteria and completed the entirety of the survey. The sociodemographic characteristics are reported in Table 1. The sample consisted of 98 females (54.1%), 79 males (43.6%), and four non-binary participants (2.2%). Participants' ages range from 19 to 73 years, with a mean age of 38.1 years ($SD = 13.9$). Regarding educational attainment, 1 participant (0.6%) had some high school education, 23 participants (12.7%) had completed high school or equivalent, 63 participants (34.8%) had some college education, 75 participants (41.4%) held a bachelor's degree, and 19 participants (10.5%) held a graduate or professional degree.

Survey Design

The survey consisted of a one-group design with a two-variable comparison of psychological distress from Alzheimer's disease genetic testing and resilience. Google Forms was used to generate a survey consisting of the preliminary question regarding current cognitive impairment, two embedded scales, a question regarding family history of Alzheimer's

disease: “Do you have a history of Alzheimer’s disease in your family?” (Questionnaire 1), and demographic questions (Questionnaire 1). The study items were piloted among five participants to determine the appropriateness and consistency of the items.

Description of Scales

Impact of Genetic Testing for Alzheimer’s Disease Scale. The first scale, Impact of Genetic Testing for Alzheimer’s Disease (IGT-AD; Appendix 1), assessed the dependent variable, psychological distress from receiving Alzheimer’s disease genetic testing (Chung et al., 2009). The IGT-AD scale was developed to accurately assess the psychological distress associated with genetic testing for Alzheimer’s disease. While existing risk assessment scales predominantly focus on measuring depression and anxiety (Chung et al., 2009), the IGT-AD scale was formulated to gauge the psychological impact of genetic susceptibility to Alzheimer’s disease, incorporating insights from other genetic testing impact assessment scales (Cella et al., 2002). This instrument is designed for clinical and research applications, providing a concise self-report measure of the psychological impact of genetic susceptibility to Alzheimer’s disease (Chung et al., 2009).

This 16-item scale used a 4-point response scale where 0 was “strongly disagree,” and 5 was “strongly agree.” The total score ranges from 0-80, with higher scores reflecting greater psychological distress related to Alzheimer’s disease genetic testing (Chung et al., 2009). In their study, Chung et al. (2009) reported a mean of 16.9 with a standard deviation of 9.9, serving as a reference point for interpretation, along with a Cronbach’s α of 0.82 for the scale. The IGT-AD was assessed for construct validity by comparing the final scale to other established psychometric scales, including the Impact of Event Scale (IES), the Center for Epidemiologic Studies Depression Scale (CES-D), and the Beck Anxiety Inventory (BAI). Using Spearman’s correlations, the final scale was positively correlated with all the psychometric scales indicating convergent validity (Chung et al., 2009). The assessment results suggest that the IGT-AD is a valid and reliable scale that may be a more useful and sensitive tool in measuring psychological distress specific to Alzheimer’s disease genetic testing than other generalized mood scales.

Brief Resilience Scale. The second scale, the 6-item Brief Resilience Scale (BRS; Appendix 2), was used to measure the independent variable, resilience, or

the perceived ability to bounce back or recover from stress (Smith et al., 2008). This 6-item scale used a 5-point response scale where 0 was “strongly disagree,” and 5 was “strongly agree.” The total score ranges from 0-30, with higher scores reflecting greater resilience ($M=21.18-23.88$, $SD=4.08-5.1$; Smith et al., 2018). Smith et al. (2018) reported Cronbach’s α of 0.80-0.91 for the scale. The BRS was assessed for convergent validity and was positively correlated with resilience measures, including optimism, social support, and life purpose, and was negatively correlated with pessimism and negative interactions (Smith et al., 2008). The assessment results indicate that BRS is an adequate measure of resilience with good internal consistency and test-retest reliability.

Reliability and Validity in the Current Dataset

To ensure the reliability and validity of the measurement instruments in the current dataset, an analysis of internal consistency was conducted using Cronbach’s alpha. The values for Cronbach’s alpha in our dataset, demonstrating a high level of internal consistency ($\alpha=.82$ for IGT-AD and $\alpha=.94$ for BRS), were found to be consistent with previous research (Chung et al., 2009; Smith et al., 2018), affirming the instruments’ sustained reliability. Additionally, the content validity of the scales, which assess the intended constructs, was confirmed as the items were adapted from previous studies with established validity.

Data Screening and Preliminary Assumptions

Statistical analyses were performed using the SPSS 28.0 statistical software. The data met the assumptions for multiple regression analysis: (a) one continuous independent variable (IGT-AD Total Scores), one continuous dependent variable (BRS Total Scores), and one dichotomous mediator variable (family history), (b) independent observations, (c) a linear relationship exists between the independent and dependent variables, (d) homoscedasticity is present, (e) no multicollinearity, (f) no outliers, and (g) the residuals are normally distributed. A Durbin-Watson statistic was conducted to support the independence of residuals ($DW = 1.743$). Standardized residuals indicated approximately normally distributed errors, as did the normal P-P plot of standardized residuals. Tests for multicollinearity showed no concern (BRS total scores, Tolerance = .994, $VIF = 1.006$; Family history, Tolerance = .994, $VIF = 1.006$).

In order to explore the potential mediating effect

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of family history on the relationship between psychological distress and resilience, a mediator analysis using regression was applied. In the mediator analysis, psychological distress and resilience are defined as the dependent and independent variables, respectively, while family history is defined as the mediator to determine if family history impacts the relationship. The PROCESS Macro Model 4 for SPSS was utilized to apply a bias-correct non-parametric bootstrapping technique with 5000 resamples to estimate family history's direct, indirect, and total effects (Preacher & Hayes, 2008). All assumptions for the mediator analysis using regression analysis were met.

Results

Descriptive Statistics

The survey's descriptive statistics are reported in Table 2. The sample contained 52 participants with a family history of Alzheimer's disease (28.7%) and 129 participants without (71.3%). No family history was coded as 0, and family history was reported as 1 with a reported mean of .287 ($SD = .454$). The total scores of the IGT-AD scale ranged from 1 to 72, with a mean score of 34.3 ($SD = 11.8$), indicating moderate psychological distress related to Alzheimer's disease genetic testing for the sample. The total score of the BRS scale ranged from 6 to 30, with a mean score of 19.8 ($SD = 5.4$), indicating a moderately resilient sample.

Statistical Analyses

Multiple Regression Analysis

A multiple regression analysis was performed to investigate the relationship between psychological distress from Alzheimer's disease-related genetic testing (IGT-AD scores) and resilience (BRS scores). The model, incorporating BRS scores as the independent variable and IGT-AD scores as the dependent variable, yielded a significant negative association (Figure 1). The multiple correlation coefficient (R) was 0.415, indicating a moderate correlation between the predicted and observed values of IGT-AD scores and the predictor variable. The regression model, involving BRS scores, accounted for 17.22% of the variance in IGT-AD scores ($R^2 = .172$, $F(2,175) = 16.057$, $p < 0.001$). The unstandardized coefficient for BRS scores was -0.829 ($p < 0.001$), indicating that, for each unit increase in BRS scores, IGT-AD scores decreased by 0.829 units.

Covariate Analysis

To assess the potential influence of covariates on

the relationship between BRS and IGT-AD scores an analysis of the covariates, including age, gender, and education was conducted. Education level emerged as a significant predictor ($B = 1.963$, $SE = 0.892$, $\beta = 0.151$, $t = 2.202$, $p = .029$), suggesting that individuals with higher education levels experienced higher psychological distress. The results of this analysis revealed that after controlling for these covariates, the relationship between BRS and IGT-AD scores remained statistically significant ($F(22,153) = 1.877$, $p = .015$, $\eta^2 = .212$).

Mediator Analysis

The mediator analysis results are reported in Table 3. The analysis of family history revealed a non-significant effect on IGT-AD scores ($p = .163$), suggesting family history did not significantly influence the scores. The interaction term between BRS scores and family history did not significantly contribute to the variance in IGT-AD scores ($R^2 = 0.011$, $F(1, 175) = 2.326$, $p = 0.129$), suggesting that the relationship between BRS scores and IGT-AD scores were not influenced by the presence of family history. Bootstrap analysis further supported the regression results.

Discussion

The present study investigated the relationship between resilience and psychological distress resulting from genetic testing for Alzheimer's disease among unimpaired individuals. The findings indicated a significant negative correlation between resilience and psychological distress, indicating that higher levels of resilience were associated with lower levels of distress related to genetic testing for Alzheimer's disease, irrespective of age and gender. These results support previous research that resilience can act as a protective factor against psychological distress in the context of genetic testing for hereditary diseases (Ho et al., 2010).

The negative correlation between resilience and psychological distress suggests that individuals with higher resilience may cope more effectively with the potential implications of genetic testing for Alzheimer's disease. Resilience allows individuals to adapt positively to challenging situations and adversities (Garmezy, 1991), which may translate into reduced distress when faced with the possibility of developing Alzheimer's disease. Higher levels of resilience may enable individuals to maintain emotional well-being despite the perceived threat of the disease and the uncertainty associated with genetic testing results (Yasien et al., 2016).

The results also showed that family history did not significantly mediate the relationship between resilience and psychological distress. This suggests that individuals with higher resilience may be better equipped to cope with the emotional impact of genetic testing, regardless of their family history. While a family history of Alzheimer's disease can increase the risk of developing the condition (Liu & Cao, 2014), it did not significantly impact how resilience influenced the psychological distress associated with genetic testing for the disease.

The development and use of the IGT-AD scale were essential in measuring the psychological impact of genetic susceptibility to Alzheimer's disease (Chung et al., 2009). Previous scales primarily targeted depression and anxiety, but the IGT-AD scale provides a more specific and sensitive measure for assessing distress specifically related to Alzheimer's disease genetic testing. Using validated and reliable measures, such as the IGT-AD and the BRS, strengthens the study's validity and supports the generalizability of the findings to other populations undergoing genetic testing for hereditary diseases.

The present study contributes to the existing literature by focusing on unimpaired individuals' psychological distress related to genetic testing for Alzheimer's disease. Understanding the factors that influence individuals' responses to genetic testing is crucial, as it can help identify those at higher risk of experiencing distress and guide the development of tailored interventions. The results suggest that resilience-based interventions may be beneficial for individuals undergoing genetic testing for Alzheimer's disease, as they may help mitigate the psychological distress associated with receiving test results (Wang et al., 2021).

Limitations

The present study had some limitations that should be acknowledged. The sample consisted of a convenience sample of unimpaired individuals recruited online, limiting the generalizability of the findings to the broader population. Future research could aim to recruit a more diverse and representative sample to increase external validity. The study's cross-sectional design does not allow for causal inferences, and future longitudinal studies can better examine the relationship between resilience and psychological distress over time. It is crucial to acknowledge that the IGT-AD and BRS scales were not counterbalanced in this study, thereby introducing the possibility

of order effects influencing participants' responses. Self-report measures are subject to response biases, and participants may have provided socially desirable responses, leading to potential measurement errors.

Another potential limitation arises from the reliance on participant-reported family history of Alzheimer's disease. This information could be subject to variations in accuracy, as it depends on participants' knowledge and the extent of their inquiries within their families. Some participants may have inquired about Alzheimer's disease in only a few generations, while others may have gone further back in their family tree. For future research, adopting more standardized and comprehensive methods for assessing family history may enhance the accuracy of this variable.

Implications and Future Research

The study's findings have several implications for clinical practice and future research. First, identifying individuals at higher risk of psychological distress related to genetic testing can inform the development of targeted support and counseling services to help individuals cope with the emotional impact of test results. Healthcare providers should consider incorporating resilience-based interventions as part of pre-and post-genetic counseling for Alzheimer's disease and other hereditary conditions. Such interventions may help individuals develop coping strategies and enhance their emotional well-being in the face of potential risk ultimately aiding in the reduction of stress that can contribute to the accelerated progression and neurodegeneration of Alzheimer's disease (Justice, 2018).

While the present study did not explicitly assess the temporal aspect of psychological distress, it is essential to acknowledge that distress may vary over time. Genetic testing results can trigger acute stress reactions, followed by an adjustment period. For some individuals, this psychological distress may be temporary, while for others, it may extend into a more prolonged and chronic experience. Future research could delve into the dynamics of psychological distress over time in relation to genetic testing results, examining the factors influencing its duration and intensity.

Future research should explore other potentially protective factors, such as social support, coping strategies, and personality traits, to gain a comprehensive understanding of the factors that influence psychological distress related to genetic testing for Alzheimer's disease. Longitudinal studies can also provide insights

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into how resilience evolves over time in response to receiving genetic testing results and the progression of Alzheimer's disease. Additionally, examining the long-term impact of genetic testing results on psychological well-being and behavior, especially in those with a family history of Alzheimer's disease, can offer valuable information for personalized interventions.

Conclusion

In conclusion, the present study adds to the growing body of literature on psychological distress related to genetic testing for Alzheimer's disease by examining the role of resilience as a protective factor. The findings highlight the importance of resilience in coping with the potential emotional impact of receiving genetic testing results and suggest that resilience-based interventions may be beneficial in supporting individuals undergoing genetic testing for Alzheimer's disease. Healthcare providers should consider incorporating resilience-based strategies in genetic counseling sessions to enhance individuals' ability to cope with the emotional challenges of genetic testing. Further research is needed to explore other potentially protective factors and their role in influencing psychological distress related to genetic testing for Alzheimer's disease, ultimately improving support and care for individuals at risk.

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RESILIENCE AND PSYCHOLOGICAL DISTRESS

Table 1

Sociodemographic Characteristics of the Participants

Sample Characteristics	<i>N</i>	%	<i>M</i>	<i>SD</i>
Gender				
Male	79	43.6		
Female	98	54.1		
Non-binary	4	2.2		
Age			38.1	13.9
Education				
Some high school	1	0.6		
High school or equivalent	23	12.7		
Some college	63	34.8		
Bachelor's degree	75	41.4		
Graduate/Professional degree	19	10.5		

BURGEI

Table 2*Survey Descriptive Statistics*

Survey Descriptives	<i>N</i>	%	<i>M</i>	<i>SD</i>
Family History			.287	.454
With Alzheimer's disease	52	28.7		
Without Alzheimer's disease	129	71.3		
IGT-AD Total Scores			34.3	11.8
BRS Total Scores			19.8	5.4

RESILIENCE AND PSYCHOLOGICAL DISTRESS

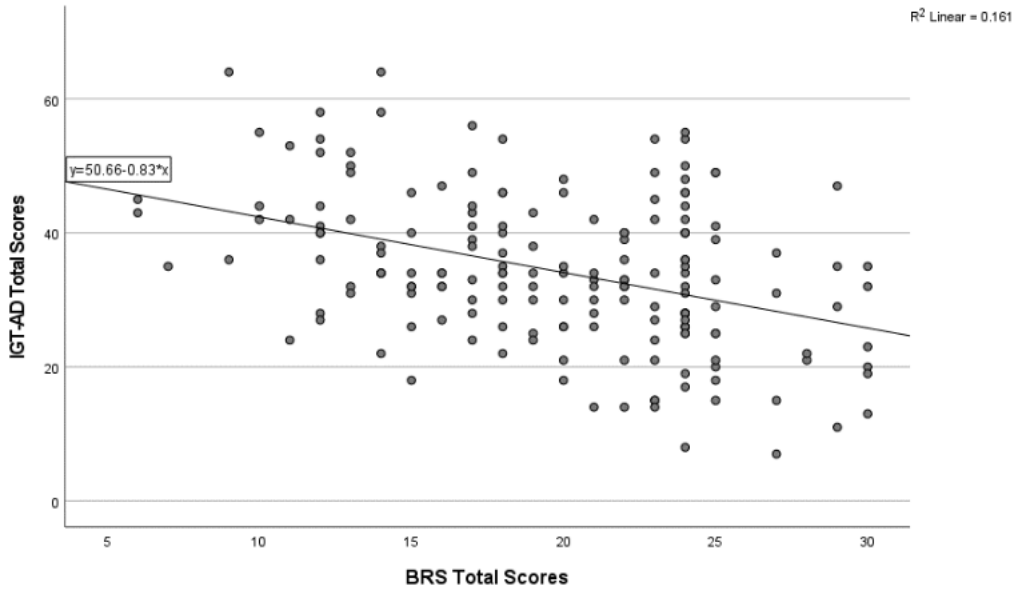
Table 3*Mediator Analysis*

Effect	Regression Coefficient	SE	95% CI		<i>p</i>
			LL	UL	
Intercept	52.757	3.355	46.136	59.378	.000
BRS Totals	-.941	.161	-1.259	-.623	.000
Family History	-9.643	6.874	-23.210	3.925	.163
Interaction	.525	.344	-.154	1.204	.129

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Figure 1

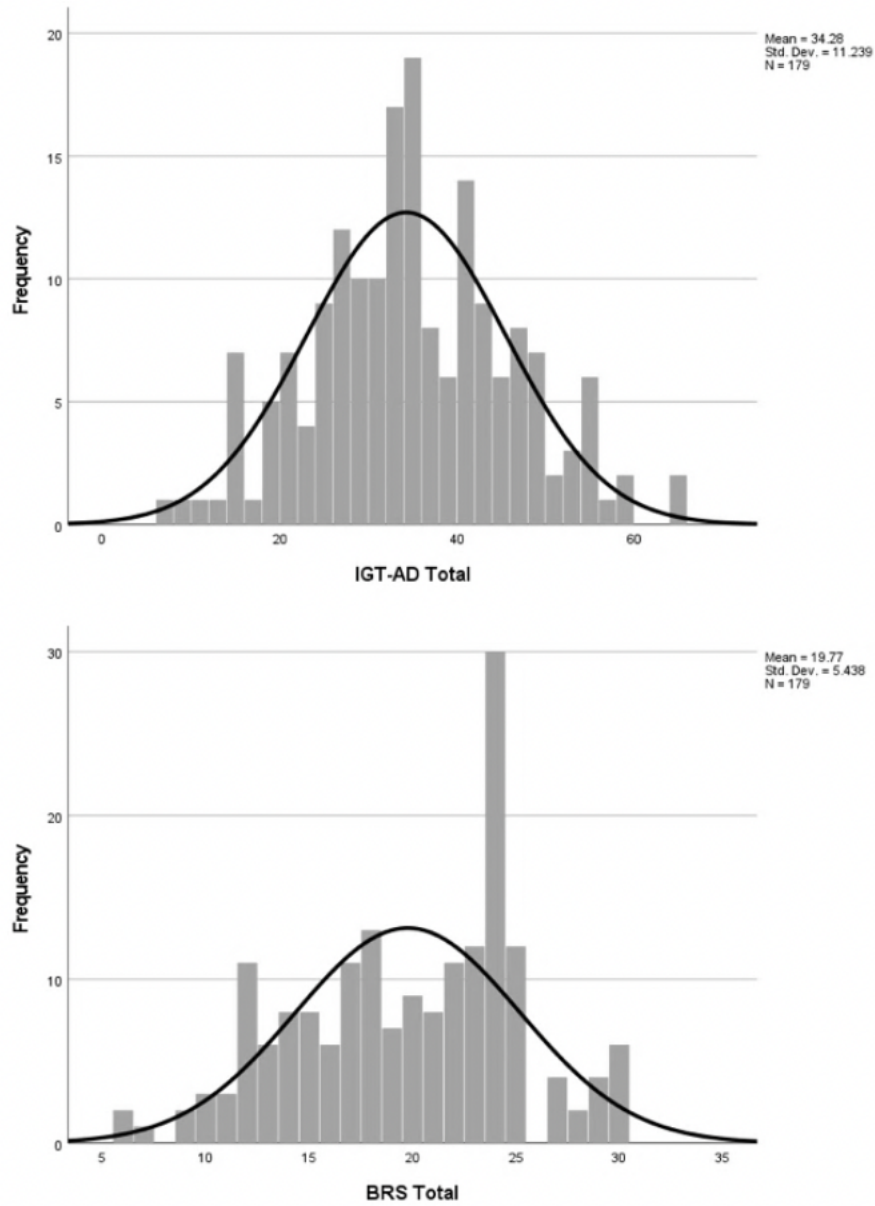
Scatterplot of BRS and IGT-AD Total Scores



RESILIENCE AND PSYCHOLOGICAL DISTRESS

Figure 2

Normality Distribution of IGT-AD and BRS Total Scores



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Appendix 1

The Reveal Impact of Genetic Testing in Alzheimer’s Disease Scale (IGT-AD)

The questions below are about specific responses you may have about receiving your Alzheimer’s disease genetic test results. Please evaluate your response to receiving your results and answer every question in this section. Indicate whether you strongly disagree, disagree, agree, or strongly agree with each statement, by selecting the corresponding response.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I would feel upset about receiving my test result	● (0)	● (1)	● (3)	● (5)
I would feel sad about receiving my test result	● (0)	● (1)	● (3)	● (5)
I would feel anxious or nervous about receiving my test result	● (0)	● (1)	● (3)	● (5)
I would feel relieved about receiving my test result	● (5)	● (3)	● (1)	● (0)
I would feel happy about receiving my test result	● (5)	● (3)	● (1)	● (0)
I would feel a loss of control	● (0)	● (1)	● (3)	● (5)
I would have problems enjoying life because of my test result	● (0)	● (1)	● (3)	● (5)
I would feel worried about my risk of getting Alzheimer’s disease	● (0)	● (1)	● (3)	● (5)
I would feel uncertain about what my test result means about my risk of developing Alzheimer’s disease	● (0)	● (1)	● (3)	● (5)
I would feel uncertain about what my test result means for my child(ren)’s and/or family’s Alzheimer’s disease risk	● (0)	● (1)	● (3)	● (5)
I would feel frustrated that there are no definite Alzheimer’s disease prevention guidelines for me	● (0)	● (1)	● (3)	● (5)
I would feel concerned about how my test results will affect my insurance status	● (0)	● (1)	● (3)	● (5)
I would have difficulty talking about my test results with family members	● (0)	● (1)	● (3)	● (5)

RESILIENCE AND PSYCHOLOGICAL DISTRESS

I would feel frustrated that there are no definite Alzheimer's disease prevention guidelines for me	● (0)	● (1)	● (3)	● (5)
I would feel concerned about how my test results will affect my insurance status	● (0)	● (1)	● (3)	● (5)
I would have difficulty talking about my test results with family members	● (0)	● (1)	● (3)	● (5)
I would feel that my family will be supportive during genetic counseling and testing process	● (5)	● (3)	● (1)	● (0)
I would feel satisfied with family communication about my genetic test result	● (5)	● (3)	● (1)	● (0)
I would feel regret about getting my test results	● (0)	● (1)	● (3)	● (5)

Note. Items 4, 5, 14, and 15 are reverse scored. To score, add the responses varying from 1-5 for all sixteen items, giving a range from 0-80.

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Appendix 2

Brief Resilience Scale (BRS)

Please respond to each item by marking one response	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I tend to bounce back quickly after hard times.	● (1)	● (2)	● (3)	● (4)	● (5)
I have a hard time making it through stressful events.	● (5)	● (4)	● (3)	● (2)	● (1)
It does not take me long to recover from a stressful event.	● (1)	● (2)	● (3)	● (4)	● (5)
It is hard for me to snap back when something bad happens.	● (5)	● (4)	● (3)	● (2)	● (1)
I usually come through difficult times with little trouble.	● (1)	● (2)	● (3)	● (4)	● (5)
I tend to take a long time to get over set-backs in my life.	● (5)	● (4)	● (3)	● (2)	● (1)

Note. Items 2, 4, and 6 are reverse scored. To score, add the responses varying from 1-5 for all six items, giving a range from 6-30.

RESILIENCE AND PSYCHOLOGICAL DISTRESS

Questionnaire 1

Family History and Demographic Questions

Do you have a history of Alzheimer's disease in your family?

Yes (1)

No (0)

What is your gender?

Male

Female

Other

What is your age?

What is your highest level of education completed?

Some high school

High school graduate or equivalent

Some college

Bachelor's degree

Graduate/Professional degree

Loneliness During the COVID-19 Pandemic: Implications for Mental Health and Substance Use

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Aim: Traumatic stressor events disrupt the normal daily functioning of individuals and groups, and the consequences of collective trauma magnify psychopathology and mental health issues. One overlooked mental health implication of traumatic stress is loneliness. The current study examines loneliness as a result of traumatic stress and its psychosocial correlates, including substance abuse and changes in daily health behaviors. **Design:** Cross-sectional, nationwide, online survey. **Methods:** This study was a cross-sectional, nationwide online survey that included 2,530 adults in the United States, 18-83 years old, and examined the associations between loneliness and psychosocial factors and substance use during the initial part of the COVID-19 pandemic. **Results:** Increased loneliness was associated with younger age, single marital status, and lower levels of education. Mental health disorders, including major depression, generalized anxiety, and somatization, were also associated with high levels of loneliness. Further, individuals with high levels of loneliness were more likely to report increased substance use, including alcohol and illicit drugs. **Discussion:** The findings of this study indicate that during times of collective traumatic events, high levels of loneliness are a risk factor for mental health and substance use. Further initiatives are warranted to create awareness and institute routine screenings for symptoms of loneliness to mitigate mental health distress and increases in substance abuse.

Keywords: loneliness, isolation, mental health, alcohol use, traumatic stress

Natural disasters, school and public shootings, community violence, domestic terrorism, and most recently, the COVID-19 pandemic are all profound instances of complex traumatic stressor events. While each of these stand alone, the COVID-19 pandemic was a global traumatic stressor event that invoked feelings of fear, uncertainty, and confusion, consequently disrupting one's sense of safety, stability, and security worldwide (Taylor, 2022). The collective trauma caused by the COVID-19 pandemic included all the devastating societal complications and disruptions to daily living that negatively affected individuals, families, and communities worldwide (Holman et al., 2023). Following the COVID-19 pandemic, the collective trauma included the broader psychological reactions to the traumatic event itself along with details of the event held in the collective memory of people (Hirschberger, 2018; Macias et al., 2021). The traumatic stressors associated with the COVID-19 pandemic, such as mandated social distancing, contributed to the risk of psychological vulnerability to psychopathology with detrimental impacts on mental health and well-being (Cordaro et al., 2021). However, the effects on mental health from traumatic stress associated with the pandemic often overlook loneliness and its psychosocial correlates to anxiety and depression symptomology and substance use (Cadi-gan et al., 2023). Understanding these associations can mitigate the onset and severity of loneliness and

psychopathology for future traumatic stressor events (Vindegaard & Benros, 2020; Wang et al., 2020).

Loneliness is broadly defined as dissatisfaction with the quality of one's social relationships, and the perceived absence of connection co-occurs with psychological distress (Pinquart & Sorensen, 2001). The cognitive dissonance between an individual's desired level of social harmony and their perceived experience of lacking connection causes feelings of inadequacy, regardless of the objective quality of their social network (Burholt et al., 2017). This implies that an absence of social contact does not predict loneliness. Instead, discontent with the perceived intimacy of one's relationships produces loneliness.

Outside traumatic stressor events, a broad range of risk factors are associated with loneliness, and a comprehensive theoretical framework has yet to be fully developed (Clark et al., 2021). Previous studies suggest that loneliness is prevalent throughout all demographics and cultures (Hutten et al., 2021; Victor & Yang, 2012). There is a consistent pattern of loneliness across the human lifespan, and individuals under 18 and over 65 experience loneliness at higher rates than other age groups (Hawkey & Cacioppo, 2010). Furthermore, other demographic factors, such as sex, education level, socioeconomic status, ethnicity, and immigration status, are predictors of loneliness, with age increasing the likelihood of risk (Beutel et al., 2017; Bosma et al., 2015). Some key

factors influencing loneliness are physical health, mental health, and social support (Hawkley et al., 2008).

Loneliness combined with depression is associated with an increased morbidity risk, including major chronic health conditions and poor physical health (Stek et al., 2005). Specifically for older adults, social isolation is associated with a higher likelihood of premature mortality. It is related to an increased risk for secondary aging, such as cognitive decline and various forms of dementia, including Alzheimer's disease (Lara et al., 2019; Wilson et al., 2007). Social isolation is also associated with higher levels of psychological distress (Campagne, 2019).

Loneliness is a common predictor of well-being, and higher levels of loneliness are associated with mental health issues and psychopathology (Ernst et al., 2022). In addition, chronic isolation can undermine daily functioning and has been extensively linked with suicidality and self-harm (Mushtaq et al., 2014; Stravynski & Boyer, 2001). Several common mental health disorders demonstrate comorbidity with loneliness, particularly major depressive disorder (MDD) and generalized anxiety disorder (GAD; Muyan et al., 2016). In fact, social isolation resulted in a 25% increase in the global prevalence of depression and anxiety (World Health Organization, 2022).

While the literature is sparse regarding loneliness and traumatic stressor events prior to the pandemic (Palgi et al., 2012), loneliness during the pandemic has been linked to drug and alcohol abuse, and the relationship between loneliness and substance use is mediated by depression and anxiety (Horigian et al., 2020). This suggests that as loneliness levels increase, substance use also increases, and at least part of this relationship operates through poor mental health. It has been suggested that substances like alcohol and marijuana use temporarily alleviate feelings of social isolation (Ingram et al., 2020). As with mental health, the pandemic has caused an increase in substance use across a wide range of demographics (Fitzke et al., 2021). However, quality social support and relational connectedness can buffer the adverse effects that loneliness can have on mental health and daily functioning. Likewise, resilience and post-traumatic growth associated with traumatic stressor events are significantly related to social support derived from social connection (Hall et al., 2010; Xu & Ou, 2014).

The Study

While there is ample research about general social isolation and loneliness, less is known about social isolation and traumatic stressors caused by the pandemic, which is considered a historical traumatic stressor event (Usher et al., 2020). Given the adverse outcomes of loneliness within the general population, it is essential to understand the factors related to loneliness during the initial part of the COVID-19 pandemic. Similar studies have examined the relationship between loneliness, mental health, and substance use during the pandemic. The present study captures these factors while also examining other psychosocial factors, including stress, somatization, fatigue, quality of life, and changes in daily behaviors. Thus, the broad aim of this study was to investigate how loneliness during a historical traumatic stressor event (i.e., pandemic) affected U.S. adults. It was hypothesized that high levels of loneliness would correspond with poorer mental health and increased substance use.

Method

Study Setting and Sampling

Between April 14 and April 22, 2020, a total of 2,530 participants included in this study were recruited through a nationwide Facebook Sponsored Ads campaign, while the recommended stay-at-home initiatives were in place in the United States. The posted online campaign targeted the Facebook newsfeeds of 76,100 users 18 years of age or older, inviting individuals to participate voluntarily in an anonymous online study that evaluated the psychological responses to the COVID-19 pandemic. The post provided a link directing the participants to a Qualtrics survey. From the online post, 4,406 respondents clicked on the link, and 2,739 provided informed consent and completed the online survey. Participants were informed that they could skip any questions they were uncomfortable answering. Only participants who completed the UCLA Loneliness Scale portion of the survey are included in the current study ($N = 2,530$). The mean age of participants in this study's sample is 47.7 ($SD = 12.9$) years, ranging between 18 and 83 years, with 89.0% female and 91.3% White. Of the participants in this study, 28.7% (725) were single, 55.1% (1390) were married, and 16.1% (407) were divorced, separated, or single. Further, the education level breakdown for the participants in this study was 5.6% (141) with at most a high

school diploma, 30.4% (766) with some college, 31.5% (796) with a 4-year degree, and 32.5% (820) with a graduate or professional degree. This study was approved by the University Institutional Review Board (#7221).

Demographics

Participants were asked to provide information about their age, gender identity, race and ethnicity, marital status, education level, and if they had children under 18.

Instruments

Psychosocial Measures

Loneliness. Loneliness was assessed using the 20-item UCLA Loneliness Scale (UCLA; Russell et al., 1978). This measure assesses feelings of loneliness and social isolation using a 4-point Likert scale with responses ranging from “*I never feel this way*” (1) to “*I often feel this way*” (4), and total scores range between 20 to 80, with higher scores indicating greater loneliness. Examples of items from this scale include “How often do you feel left out?” and “How often do you feel isolated from others?” This is a reliable and validated scale (Russell, 1996; Russell et al., 1980). For this study, the overall scale ($M = 44.9$, $SD = 11.7$) provided excellent internal consistency ($\alpha = .94$). The cut-offs for loneliness severity on the UCLA scale were adapted from Cacioppo and Patrick (2008), which included: Total score $< 28 =$ No/Low Loneliness, Total score $28 - 43 =$ Moderate Loneliness, and Total score $> 43 =$ High Loneliness.

Perceived Stress. Stress was measured using the Perceived Stress Scale (PSS; Cohen et al., 1983). The PSS assesses general life stressors using ten items within a 1-month time frame. Participants were asked to respond to each item using a 4-point Likert scale ranging from “*never*” (1) to “*very often*” (4), with total scores ranging between 10 and 40, with higher scores indicating greater stress. An example of an item on this scale is, “How often have you felt nervous and stressed?” The PSS is commonly used in both research and clinical practices and is shown to be a valid and reliable scale (Cohen et al., 1983; Lee, 2012). The overall scale ($M = 19.3$, $SD = 7.4$) for this study provided good internal consistency ($\alpha = .90$).

Major Depressive Disorder. Major Depressive Disorder (MDD) was assessed using the Patient Health Questionnaire – Major Depression Subscale (PHQ-9; Spitzer et al., 2006). Using a scoring algorithm to determine if the participants meet the criteria for a provisional diagnosis of MDD, the PHQ-9

contains nine stated problems to which the respondents indicated if they have been bothered by these problems in the past two weeks using one of four options ranging from “*not at all*” (0) to “*nearly every day*” (3). An example of a problem is “Feeling down, depressed, or hopeless” (Spitzer et al., 1999). The PHQ-9 is a psychometrically sound questionnaire commonly used in research and clinical practices for general populations (Kroenke et al., 2010).

Generalized Anxiety Disorder. Generalized Anxiety Disorder was determined using the Patient Health Questionnaire – Generalized Anxiety Disorder Subscale (GAD-7; Spitzer et al., 2006). The GAD-7 is a brief screening tool commonly used in research and clinical practices that provides a provisional diagnosis of generalized anxiety disorder (GAD; Lowe et al., 2008). The GAD-7 includes seven statements in which participants indicated if they have been bothered by them in the past 2 weeks ranging from “*not at all*” (0) to “*nearly every day*” (3). This study used the scoring algorithm rather than the cut-off scores to determine if participants met the criteria for the GAD diagnosis.

Fatigue. Aspects of Fatigue were assessed using the Checklist of Individual Strength (CIS; Vercoulen et al., 1999). The CIS includes four domains: general fatigue, motivation, physical activity, and concentration. The composite scale consists of 20 items to which the participants respond to prompts such as “Thinking requires effort” on a 7-point Likert scale ranging from “*yes, that is true*” (7) to “*no, that is not true*” (0). The overall scale ($M = 85.2$, $SD = 25.4$) for this study provided good internal consistency ($\alpha = .94$).

Quality of Life. Quality of Life was assessed using the World Health Organization Quality of Life BREF Scale (WHOQOL, 1996; WHOQOL-Group, 1998). The WHOQOL-BREF instrument uses 26 items to assess four specific domains related to the quality of life: physical health, psychological health, social relationships, and environment. Examples of items from this instrument include, “To what extent do you feel your life to be meaningful?” and “How satisfied are you with the support you get from your friends?” Using specific criteria to transform raw scores into standardized scores, the final scores range from 0 to 100, with higher values indicating better quality of life (WHOQOL, 1996).

Specific Measures Developed for the Current Study

Changes in Daily Behaviors. Changes in Daily Behaviors were assessed through specific items created by the researchers for this study. The participants were asked to indicate whether certain general daily health behaviors, including sleep, food consumption, and technology use, had *stayed the same, increased, decreased, or were not applicable* since before the pandemic began.

Changes in Substance Use Behaviors. Changes in Substance Use Behaviors were assessed through specific items created by the researchers for this study. The participants were asked to indicate whether certain substance use behaviors had *stayed the same, increased, decreased, or were not applicable* since before the pandemic began. The specific substance use behaviors assessed included: alcohol use, cigarette use, marijuana use, opioid drug use, illicit drug use, anti-anxiety medication use, and sleep aid use.

Data Collection and Data Analysis

The data collected for this study were weighted to the total U.S. population based on the 2018 U.S. Census Bureau population estimates by age, sex, and race/ethnicity (U.S. Census Bureau, 2020). Four age strata, two sex strata, and four race/ethnicity strata were used for the weighting procedure. To account for geographic clustering, a variable was also created based on the first two digits of the U.S. zip codes requested during data collection. Complex Sample Designs were used to conduct chi-square tests of independence for categorical comparisons and one-way ANOVAs for continuous variables, controlling for age, marital status, and education level and adjusting for population weights, strata, and clustering. Post-hoc comparisons are reported in the tables for variables with significant differences. The significance level was set at $\alpha = .05$, and pairwise deletion was used for any missing data points. A post-hoc power analysis using a one-way ANOVA, with $N = 2,530$, $\alpha = .05$, and moderate effect size, indicated adequate power ($1 - \beta$) = 1.00. All analyses were conducted using SPSS version 27 (IBM, Inc., Chicago, IL).

Results

A total of 2,530 participants were included in the study and were placed into one of three comparison groups based on their total scores on the UCLA Loneliness Scale. The cut-off scores for loneliness severity on the UCLA scale were adapted from Cacioppo and Patrick (2008) and included: No/Low Loneliness (< 28; NLL; $n = 164$), Moderate Loneliness (28-43; ML;

$n = 945$), and High Loneliness (> 43; HL; $n = 1,421$).

The comparisons of the demographic variables are shown in Table 1. There was a significant difference between the comparison groups when evaluating age, such that the participants in the NLL group were older than those in the ML and HL groups ($p = .014$). No significant differences were identified between the participants in the comparison groups when evaluating gender, race/ethnicity, living arrangements, or children under the age of 18 (all $ps > .05$). When comparing participants on marital status, there was a significant difference in proportions of participants in each of the comparison groups, such that there was a higher proportion of participants in the HL group who were either Single or Divorced/Widowed and a higher proportion of participants in the NLL group who were Married ($p = .011$). Further differences were identified between the comparison groups based on education levels. A higher proportion of participants identified as having Some College (possibly being college students) were in the HL group. In contrast, many participants in the NLL group indicated having Graduate or Professional degrees ($p = .025$).

Age, marital status, and education level were included as covariates for the comparisons of psychosocial variables (see Table 2). There was a significant difference in levels of perceived stress between the participants in the three comparison groups. Those in the HL group had the highest mean score, followed by those in the ML group, and those in the NLL group had the lowest level of perceived stress ($p < .001$). When comparing rates of psychopathology, participants in the HL group had the highest proportion of individuals who met the criteria for major depressive disorder (MDD, 33.8%), generalized anxiety disorder (GAD, 25.3%), and somatization disorder (SD, 20.1%), compared to those in both the ML (MDD, 9.4%; GAD, 9.4%, SD, 9.8%) and NLL (MDD, 1.7%; GAD, 3.9%, SD, 1.6%) groups (all $ps < .01$). When comparing the four domains of the CIS, the participants in the HL group had significantly higher scores in all subscales (fatigue, concentration, motivation, and physical activity; all $ps \leq .001$) compared to the participants in the NLL group. Further differences were identified when comparing the quality-of-life indices between the participants in the comparison groups on the four subscales of the WHOQOL-BREF. The participants in the NLL group reported significant-

ly better quality of life in the physical health ($p = .013$), psychological ($p < .001$), social relationships ($p < .001$), and environmental ($p < .001$) subscales compared to the participants in the HL comparison group.

The comparisons of the changes in general daily behaviors from before the onset of the pandemic also controlled for age, marital status, and education level and are shown in Table 3. There was a significant difference between comparison groups on the change in sleep, such that a higher proportion of the HL group indicated a decrease in sleep ($p = .006$). A question was asked about changes in eating behaviors. While no significant differences were identified between the groups based on junk food consumed, there was a difference in total food consumed. A greater proportion of participants in the HL group indicated an increase or a decrease in food consumption, while a greater proportion of participants in the NLL and ML groups reported no changes in food consumption ($p = .011$). Questions about changes in physical activity showed that a greater proportion of participants in the HL group indicated a decrease in outdoor physical activity (both $p = .005$). Changes in technology use also differed significantly among the comparison groups. A higher proportion of participants in the ML and HL groups reported increased news coverage (watched or read; $p = .038$). A higher proportion of the HL group reported a significant increase in TV watching ($p = .015$).

The last set of comparisons is focused on increases in substance use behaviors during the initial COVID-19 Pandemic (see Table 4). For these comparisons, only those individuals who indicated that they use those substances are included. There is a significant difference in the increased rates of alcohol use since the pandemic began for the participants in the ML (36.5%) and HL (39.5%) groups compared to the participants in the NLL group (18.4%; $p = .002$). Likewise, the HL group had higher rates of increased marijuana use (42.5%) as compared to the NLL group (30.9%) and ML group (37.7%; $p = .002$). Increases in opioid use were also significantly higher for those in the HL group compared to the NLL or ML groups ($p = .006$). While the overall number of participants who use illicit drugs is small, there was a significant increase noted in illicit drug use between the participants in the comparison groups, with the highest proportion (38.4%) in the HL group, followed by 20.5% in the NLL group, and 14.9% in the ML group ($p =$

.003). Of the other substances compared, no significant differences in increases between the comparison groups were identified based on cigarette use, anti-anxiety medication use, or sleep aid use (all $p > .05$).

Discussion

The purpose of the study was to identify and profile individuals in the U.S. population who reported high levels of loneliness during the initial pandemic lockdown, and to examine how loneliness relates with mental health, pandemic concerns, and substance use. We found an effect of age, with the youngest participants expressing higher rates of loneliness. This is consistent with previous research on age as a risk factor for loneliness in studies that used the same measure, such as the UCLA-3 Loneliness Scale (von Soest et al., 2020). Younger populations tend to emphasize social group size and closeness of relationships as more critical facilitators of social support (Green et al., 2001). In the current study, younger individuals may have been more impacted by the pandemic as a result of loneliness since they were isolated from broader networks of social support. This finding adds to the literature that tends to focus solely on older adult populations traditionally identified as at risk for loneliness (Chawla et al., 2021).

Married individuals made up a large majority of the group with no/low loneliness (76.9%), while single and divorced/widowed participants showed the largest percentage in the high loneliness category. Research indicates that having a spouse increases overall well-being and reduces feelings of loneliness. It is likely that having a committed partner in residence during the COVID-19 lockdown provided built-in social connection and social support, reducing many married couples' levels of loneliness (Stack & Eschleman, 1998). Within education levels, individuals with a graduate or professional degree made up over half of the no/low loneliness group. This confirms previous findings, as education is associated with numerous factors that may be protective against loneliness, including increased well-being, broader social circles, greater job satisfaction, better health, and lower divorce rates (Oreopoulos & Salvanes, 2011). Conversely, adults without a college degree experienced more financial hardships and disproportionately lost their jobs during the lockdown; both are risk factors for loneliness and may help explain this result (Parker et al., 2021).

As expected, high loneliness scores were associat-

ed with stress, depression, anxiety, and somatization symptomology. Previous research has documented loneliness as a predictor of mental health issues and disorders, whereby perceived loneliness acts as a risk mechanism for the onset and a sustaining factor for maintaining psychopathology symptoms (Law et al., 2023). In addition, participants in the ML and HL groups had increased rates of alcohol use, marijuana use, opioid use, and illicit drug use, demonstrating higher levels of loneliness as a risk factor for maladaptive coping. However, in the current study, cigarette use, anti-anxiety medication use, and sleep aid use were not significantly different among loneliness comparison groups. Previous research findings on loneliness and substance abuse are mixed and inconsistent in the literature, depending on the type of substance being used and measured (Cadigan et al., 2023).

In addition, those reporting higher loneliness levels had more difficulty with sleep, focus, motivation, and physical activity than the ML or NLL groups. All four items from the CIS used in this study share symptoms of loneliness, anxiety, and depression. Recent research shows that perceived stress levels during the beginning of the pandemic increased globally, and women, students, and young adults were the most at-risk (Gamonal-Limacoco et al., 2022). Similarly, prevalence rates of GAD, which is related to loneliness and stress (Cordaro et al., 2021), were higher at the beginning of the pandemic than before the outbreak. Health and physical safety concerns and uncertainty about the future are examples of uncontrollable, pandemic-related worries that can help explain the increase in GAD symptoms. Notably, participants with HL reported depressive symptoms at a higher rate than perceived stress, GAD, or somatization disorder. Not surprisingly, the NLL group had the highest quality of life and best scores on physical health, psychological, social relationships, and environmental measures. This stable pattern of the results of the psychosocial comparisons confirms previous findings about the symptomology of loneliness and the broad domains of life that social isolation influences (Hawley & Cacioppo, 2010; Jaremka et al., 2013).

Loneliness was a major mechanism of COVID-19 pandemic traumatic stress through the disruption and upending of general daily behaviors established prior to the onset of this traumatic stressor event. Perceived loneliness due to social isolation contributed to an up-

swing in psychological distress, psychopathology, and maladaptive coping via alcohol, marijuana, opioids, and illicit drug use. In addition, individuals experiencing higher levels of loneliness were sleeping less, eating more or less food compared to pre-pandemic functioning, and were less likely to be physically active. Last, participants reporting higher levels of loneliness showed increased smartphone use, internet use, and increased news consumption and TV watching. Collectively, these findings suggest that the use of alcohol, marijuana, opioids, illicit drugs, food consumption, and news consumption were behaviors that could temporarily alleviate or numb depression and/or anxiety symptoms and perceived loneliness. These findings on daily health behaviors are striking in that these changes are not typically associated with loneliness and can easily go unrecognized. This creates cause for concern in that individuals suffering from loneliness likely are not being screened for changes in general health behaviors. Therefore, these individuals with higher levels of loneliness are likely to elude screening, detection, and ultimately intervention and treatment (Gordy et al., 2021).

Finally, results showed that higher levels of loneliness were associated with increased alcohol consumption, marijuana, opioid, and illicit drug use. However, there were no significant associations between loneliness and the increased use of other substances such as cigarettes, anti-anxiety medications, or sleep aids. Previous studies showed a link between loneliness and substance use (Horigian et al., 2020) and between loneliness and regular alcohol use (Bragard et al., 2022), and are consistent with the findings in the current study.

Limitations

While the findings of this study have several practical implications for therapeutic interventions and bring awareness to the potential negative effects associated with high levels of loneliness, several factors in this cross-sectional study limited the interpretation of the data collected. Participants were recruited randomly via Facebook Ads, and respondents ($N = 2,530$) were 47.7 ($SD = 12.9$) years old, ranging between 18 to 83 years, with 89.0% being female and 91.3% white. Since this sample is not representative of the population, results must be interpreted accordingly. Secondly, this study was cross-sectional and used self-report measures, which may increase self-presentation bias. Further, since the participants were recruited through Facebook, it is plausible that

they may report greater levels of loneliness compared to individuals who do not frequent social media. That said, while loneliness has been connected to social media use, research suggests that lonely individuals often benefit from social media interactions (Song et al., 2014). While the UCLA Loneliness Scale is widely regarded as a reliable measure, confounding factors such as daily mood, environmental stressors, and potential distractions, which were further impacted by the pandemic, make the current study novel.

Future Directions

The present study's sample focused on individuals in the general population. However, more research on marginalized or at-risk groups experiencing loneliness during traumatic stressor events is warranted, including aging populations and those with other less typical mental health issues and disabilities. For example, individuals with intellectual and developmental disabilities are more likely to experience loneliness (Gilmore & Cuskelly, 2014; Perese & Wolf, 2009). There is also evidence that the COVID-19 pandemic disproportionately impacted these individuals due to issues such as a temporary lack of caregivers, restriction of visitors to group homes or long-term care settings, and the closing of day habilitations and vocational programs (Constantino et al., 2020). Further research is needed to assess loneliness trends due to the pandemic in these underrepresented populations.

Conclusion

In preparation for future traumatic stressor events, the consequences of loneliness can present challenges, yet preventative and early intervention strategies can be used to protect those most at risk. This study provides a nuanced depiction of loneliness during a time of traumatic stress with implications for mental health and coping behaviors. Our findings suggest that individuals with greater perceived loneliness, particularly young single adults, may experience increased levels of psychopathology (i.e., MDD and GAD) and maladaptive coping via increased alcohol and substance use. Therefore, in addition to screening for MDD and GAD, the use of screening tools for loneliness is recommended. Further, these individuals with higher levels of perceived loneliness were at increased risk for fatigue, lack of focus and motivation, and lethargy. Thus, it is important to screen and detect somatic complaints that can accompany feelings of loneliness and psychopathology. Given the important role that close social

connections play in buffering loneliness, quality social support as a protective measure should be incorporated into prevention and early prevention strategies as well. For example, including early health promotion and treatment strategies for boosting opportunities for social interactions, improving social skills and social cognition, and enhancing social support (Masi et al., 2011) in the initial stages of collective trauma can help mitigate the unwelcomed experience of loneliness.

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Table 1*Demographic Comparisons (N = 2,530)*

	No/Low loneliness 6.5% (n = 164)	Moderate loneliness 37.4% (n = 945)	High loneliness 56.2% (n = 1421)	Statistical comparison
Age	57.0 (3.3) ^{bc}	47.9 (1.4) ^a	45.2 (1.5) ^a	<i>p</i> = .014
Gender				
Male	48.7% (11.6%)	46.1% (3.6%)	45.8% (3.8%)	<i>p</i> = .949
Female	51.3% (11.6%)	53.9% (3.6%)	54.2% (3.8%)	
Race/Ethnicity				
White	78.1% (7.8%)	65.4% (6.2%)	65.0% (6.2%)	<i>p</i> = .533
Black	3.4% (3.5%)	12.3% (6.4%)	11.8% (3.5%)	
Hispanic	16.8% (6.5%)	13.3% (3.1%)	17.9% (5.9%)	
Additional Races	1.7% (1.1%)	9.0% (4.0%)	5.3% (1.9%)	
Children under 18	18.3% (7.0%)	28.6% (3.1%)	29.9% (2.0%)	<i>p</i> = .330
Marital status				
Single	14.4% (4.4%) ^{bc}	38.3% (6.1%) ^a	45.0% (3.4%) ^a	<i>p</i> = .011
Married	76.9% (7.2%) ^{bc}	51.1% (5.7%) ^{ac}	38.3% (3.1%) ^{ab}	
Divorced/ Widowed	8.7% (5.9%) ^c	10.6% (1.2%) ^c	16.7% (1.0%) ^b	
Living arrangement				
Alone	6.0% (5.7%)	6.5% (3.3%)	9.2% (1.5%)	<i>p</i> = .614
With Others	94.0% (5.7%)	93.5% (3.3%)	90.8% (1.5%)	
Educational level				
High School or Less	3.5% (3.0%) ^b	13.4% (5.9%) ^c	6.3% (1.6%)	<i>p</i> = .025
Some College	13.9% (2.4%) ^{bc}	25.3% (3.5%) ^{ac}	38.2% (3.1%) ^{ab}	
4-Year Degree	25.3% (4.5%) ^c	23.3% (3.7%) ^c	30.0% (1.8%)	
Graduate/Professional	57.3% (7.4%) ^{bc}	38.1% (5.6%) ^{ac}	25.5% (3.0%) ^{ab}	

Note. Values shown are Means or Column Percentages (Standard Errors).

Post-hoc comparisons use alphabetical superscripts to denote significant group differences with a = No/Low Loneliness; b = Moderate Loneliness; and c = High Loneliness.

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Table 2

Psychosocial Comparisons (Controlling for Age, Marital Status, and Education Level)

	No/Low loneliness 6.5% (<i>n</i> = 164)	Moderate loneliness 37.4% (<i>n</i> = 945)	High loneliness 56.2% (<i>n</i> = 1421)	Statistical comparison
Perceived stress	11.4 (0.44) ^{bc}	15.9 (0.28) ^{ac}	20.9 (0.31) ^{ab}	<i>p</i> < .001
Major depressive disorder	1.7% (0.8%) ^{bc}	9.4% (2.3%) ^{ac}	33.8% (2.9%) ^{ab}	<i>p</i> = .001
Generalized anxiety disorder	3.9% (1.5%) ^{bc}	9.4% (1.6%) ^{ac}	25.3% (1.5%) ^{ab}	<i>p</i> = .009
Somatization disorder	1.6% (0.4%) ^{bc}	9.8% (1.4%) ^{ac}	20.1% (2.4%) ^{ab}	<i>p</i> < .001
Checklist of individual strength				
Fatigue	25.1 (1.11) ^{bc}	30.8 (1.00) ^{ac}	38.5 (0.71) ^{ab}	<i>p</i> < .001
Concentration	12.8 (0.78) ^{bc}	17.0 (0.49) ^{ac}	21.0 (0.50) ^{ab}	<i>p</i> < .001
Motivation	11.3 (0.54) ^{bc}	13.6 (0.41) ^{ac}	16.9 (0.37) ^{ab}	<i>p</i> < .001
Physical activity	9.8 (0.38) ^{bc}	10.8 (0.34) ^{ac}	13.6 (0.32) ^{ab}	<i>p</i> = .001
Quality of life				
Physical health	82.8 (1.79) ^{bc}	76.8 (0.77) ^{ac}	67.9 (2.17) ^{ab}	<i>p</i> = .013
Psychological	77.2 (1.09) ^{bc}	66.4 (0.76) ^{ac}	50.9 (1.58) ^{ab}	<i>p</i> < .001
Social Relationships	79.4 (3.10) ^{bc}	67.9 (0.96) ^{ac}	43.0 (3.00) ^{ab}	<i>p</i> < .001
Environmental	83.9 (1.39) ^{bc}	71.9 (0.64) ^{ac}	61.9 (0.97) ^{ab}	<i>p</i> < .001

Note. Values shown are Means or Column Percentages (Standard Errors).

Post-hoc comparisons use alphabetical superscripts to denote significant group differences with a = No/Low Loneliness; b = Moderate Loneliness; and c = High Loneliness.

Table 3*Changes in Daily Behaviors (Controlling for Age, Marital Status, and Education Level)*

	No/Low loneliness 6.5% (<i>n</i> = 164)	Moderate loneliness 37.4% (<i>n</i> = 945)	High loneliness 56.2% (<i>n</i> = 1,421)	Statistical comparison
Sleep per night				
Stayed the same	58.5% (4.8%) ^c	47.6% (4.5%) ^c	35.0% (2.6%) ^{a,b}	<i>p</i> = .006
Increased	18.6% (4.1%)	18.1% (2.0%)	24.0% (2.1%)	
Decreased	22.9% (5.8%) ^c	34.3% (3.6%) ^c	40.9% (1.6%) ^{a,b}	
Total food consumed daily				
Stayed the same	67.0% (7.9%) ^{b,c}	46.6% (4.1%) ^{a,c}	34.5% (3.7%) ^{a,b}	<i>p</i> = .011
Increased	24.4% (8.7%) ^c	40.8% (4.6%) ^c	48.8% (3.1%) ^{a,b}	
Decreased	8.6% (4.3%) ^c	12.6% (2.3%) ^c	16.7% (2.6%) ^{a,b}	
Junk food consumed daily				
Stayed the same	45.1% (8.8%)	40.7% (5.0%)	35.1% (2.5%)	<i>p</i> = .995
Increased	34.7% (9.3%)	42.3% (3.3%)	49.2% (3.8%)	
Decreased	20.2% (7.1%)	17.0% (2.4%)	15.6% (2.3%)	
Amount daily in-home physical activity				
Stayed the same	49.7% (5.2%)	40.2% (3.6%)	43.3% (3.3%)	<i>p</i> = .386
Increased	35.0% (5.7%)	39.6% (4.1%)	24.4% (1.8%)	
Decreased	15.3% (4.9%)	20.2% (3.1%)	31.0% (2.4%)	
Amount daily outdoor physical activity				
Stayed the same	39.4% (10.1%)	34.5% (4.5%)	24.4% (2.4%)	<i>p</i> = .005
Increased	36.7% (6.3%) ^c	37.7% (3.2%) ^c	26.6% (2.6%) ^{a,b}	
Decreased	23.8% (5.1%) ^c	27.9% (1.9%) ^c	49.0% (2.3%) ^{a,b}	
Smartphone use				
Stayed the same	46.8% (5.0%)	31.2% (6.0%)	23.4% (4.4%)	<i>p</i> = .165
Increased	46.4% (7.0%)	67.1% (5.9%)	74.2% (4.3%)	
Decreased	6.8% (5.7%)	1.7% (1.2%)	2.3% (0.7%)	
Internet use				
Stayed the Same	39.1% (8.2%)	31.8% (6.3%)	23.7% (3.6%)	<i>p</i> = .160
Increased	60.5% (8.2%)	66.9% (6.1%)	75.3% (3.6%)	
Decreased	0.4% (0.3%)	1.3% (0.8%)	1.0% (0.4%)	
TV watched (not news)				
Stayed the same	49.5% (8.6%) ^c	37.3% (5.7%) ^c	30.2% (3.1%) ^{a,b}	<i>p</i> = .015
Increased	48.5% (8.9%) ^c	57.3% (5.7%) ^c	63.7% (3.3%) ^{a,b}	
Decreased	2.0% (0.6%)	5.4% (2.2%)	6.1% (0.9%)	
News watched or read				
Stayed the same	47.1% (6.9%) ^{b,c}	30.1% (3.3%) ^{a,c}	20.3% (2.4%) ^{a,b}	<i>p</i> = .038
Increased	43.5% (5.1%) ^c	62.7% (2.6%) ^a	69.2% (3.3%) ^a	
Decreased	9.4% (2.3%)	7.2% (1.9%)	10.5% (1.9%)	

Note. Values shown are Means (Standard Errors).

Post-hoc comparisons use alphabetical superscripts to denote significant group differences with a = No/Low Loneliness; b = Moderate Loneliness; and c = High Loneliness.

LONELINESS, MENTAL HEALTH, AND SUBSTANCE ABUSE

Table 4

Substance Use Increases During Initial COVID-19 Pandemic (Based on Current Users; Controlling for Age, Marital Status, and Education Level)

	No/Low loneliness	Moderate loneliness	High loneliness	Statistical comparison
Alcohol use increase (<i>n</i> = 1,217 users)	18.4% (4.7%) ^{bc}	36.5% (6.7%) ^a	39.5% (4.3%) ^a	<i>p</i> = .002
Cigarette use increase (<i>n</i> = 379 users)	14.9% (10.1%)	37.1% (9.1%)	34.7% (7.1%)	<i>p</i> = .237
Marijuana use increase (<i>n</i> = 448 users)	30.9% (11.7%) ^{bc}	37.7% (8.0%) ^a	42.5% (4.6%) ^a	<i>p</i> = .002
Opioid use increase (<i>n</i> = 117 users)	2.5% (3.4%) ^c	6.0% (4.3%) ^c	20.8% (10.5%) ^{ab}	<i>p</i> = .006
Illicit drug use increase (<i>n</i> = 54 users)	20.5% (22.1%)	14.9% (7.3%) ^c	38.4% (18.9%) ^b	<i>p</i> = .003
Anti-anxiety medication use increase (<i>n</i> = 653 users)	45.2% (9.8%)	38.5% (6.6%)	34.4% (4.5%)	<i>p</i> = .631
Sleep aid use increase (<i>n</i> = 733 users)	44.6% (9.1%)	43.5% (8.8%)	42.0% (2.8%)	<i>p</i> = .851

Note. Values shown are Column Percentages (Standard Errors).

Post-hoc comparisons use alphabetical superscripts to denote significant group differences with a = No/Low Loneliness; b = Moderate Loneliness; and c = High Loneliness.

Changes in Undergraduate Students' Self-Efficacy and Outcome Expectancy in an Introductory Statistics Course

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The exploration of psychological variables that potentially impact college student performance in challenging academic courses can be useful for understanding success in introductory statistics. Although previous research has examined specific beliefs that students hold about their abilities and future outcomes, the current study is novel in its examination of changes in both self-efficacy (SE) and outcome expectancy (OE) in relation to performance over the course of an undergraduate introductory psychology statistics course. These psychological variables—relating to one's belief about one's ability to accomplish a task and the anticipated outcomes—may impact student motivation and performance. Students' SE, OE, and other variables related to statistics performance were measured through a survey administered at the beginning and end of the course. Multivariate logistic regression and McNemar tests were conducted to examine factors that affected changes in SE and OE as the semester progressed. Students with lower scores on the final exam demonstrated a decrease in both high SE and positive OE. However, higher scores on exams earlier in the course were associated with increased odds for high SE but not for positive OE, suggesting that SE is less resilient to course performance. Based on these findings, the authors recommend that statistics instructors identify students at risk for decreasing SE. Instructors can help foster high SE in students struggling academically by connecting the course content to their everyday lives and suggesting strategies to enhance their confidence in their content knowledge and increase their comfort in navigating such a challenging course.

Keywords: statistics education, research, self-efficacy, outcome expectancy, statistics

Statistics is a mathematics-based course required by many undergraduate degree programs (Norcross et al., 2016). A statistics course is fundamental for students because it fosters critical thinking and reasoning skills (Cheng et al., 2018; Vanhoof et al., 2011; Wilson, 2013). Students of statistics courses become informed consumers of knowledge (Barber, 2002), and are equipped with the ability to evaluate and conduct analyses of research. As society's reliance on complex data increases, the ability to analyze large sets of data and apply statistical skills and techniques is required for those entering the workforce (Brown & Kass, 2009). As a result, enrollment in statistics courses from 2010-2015 increased by 19% (Blair et al., 2018) and employment opportunities for statisticians are projected to grow by 30% from 2018 to 2028, outpacing the rate of many other professions (The Bureau of Labor Statistics, 2020). Given that statistics courses carry such weight for students' academic trajectory and their eventual entry into the workforce, research devoted to variables affecting academic performance in undergraduate introductory statistics courses has received much attention.

Diverse student characteristics and behaviors have been researched in relation to statistics course performance. Studies focusing on the relationship

between sex and statistics courses report that females hold more negative perceptions about statistics (Cendales et al., 2013; Zimprich, 2012) and that statistics anxiety may manifest differently in females compared to males. For example, procrastination—the tendency to delay initiation of academic tasks—and poorer learning strategies, such as memorization, were found more likely to lead to statistics anxiety in men (Rodarte-Luna & Sherry, 2008). Students with more experience and past achievements in statistics or related fields (e.g., mathematics) have higher achievement in statistics courses (Johnson & Kuenen, 2006; Ramirez et al., 2012). Academic procrastination (Schraw et al., 2007), is negatively correlated with statistics engagement (Onwuegbuzie, 2004) and academic performance (Goroshit, 2018; Paechter et al., 2017; Rodarte-Luna & Sherry, 2008; Wang & Englander, 2010). Research on help-seeking behavior, the tendency to seek academic assistance (Newman, 2002), shows that the absence of help-seeking behavior may be related to predictors leading to lower statistics performance (Rodarte-Luna & Sherry, 2008).

Psychological factors such as motivation, student beliefs, attitudes, and emotions are particularly important as they can impact academic performance in

statistics courses. Undergraduate students who were motivated had better exam grades and valued statistics more than those not motivated (Budé et al., 2007). Students' beliefs and attitudes about their knowledge of statistics do not solely impact their course performance (Chiesi & Primi, 2009; Dempster & McCorry, 2009; Ramirez et al., 2012), but can also disrupt learning and application of statistical concepts outside of the classroom (Gal & Ginsberg, 1994). Even in classes utilizing diverse teaching styles (e.g., lecture-based versus active learning), ambivalent attitudes toward statistics remain fairly stable throughout the semester (Bateiha et al., 2020). Finally, some emotional states such as fear (Slootmaeckers et al., 2014) and anxiety (Cui et al., 2019; Davis & Mirick, 2015; Esnard et al., 2021; Trassi et al., 2022) towards statistics negatively affect student academic performance in statistics. These emotional states impact cognitive factors, which ultimately alter students' expectations of statistics courses, effort exerted, and academic performance. Specific cognitive variables and their positive relationship to academic performance in statistics including self-regulation (Acee & Weinstein, 2010; Dunn, 2014), the use of cognitive and meta-cognitive strategies (Rodarte-Luna & Sherry, 2008; Trogden & Royal, 2019), and analytical skills (Miller, 2019) have been investigated. Among these cognitive variables, one of particular importance is students' self-efficacy in statistics.

Self-efficacy is defined as an individual's perceived ability to accomplish a designated task (Bandura, 1977) and is believed to be domain-specific (Bandura, 1997; Pajares, 2009). Self-efficacy as a predictor of academic success in statistics has yielded conflicting findings. While most studies (Finney & Schraw, 2003; Mantooth et al., 2020; McGrath et al., 2015) report high self-efficacy change to be a strong predictor of academic success in statistics, other studies failed to find a significant association between increased self-efficacy and success in statistics (Mihai-Bogdan et al., 2015; Olani et al., 2011; Walker & Brakke, 2017). In one study, student self-efficacy for statistics increased as the semester progressed (Walker & Brakke, 2017). However, self-efficacy alone does not contribute to achievement in a statistics course (Franceschini et al., 2014).

Outcome expectancy refers to beliefs about anticipated outcomes of action (Bandura, 1986; 1997); these expectancies are mechanisms thought to influence performance and behavior (Bandura, 1986).

Self-efficacy is also positively associated with outcome expectancy (Williams, 2010). Many studies exploring outcome expectancy focus on risky behavior such as smoking (Glock et al., 2012; Pokhrel et al., 2014; Urbán, 2010), drinking (Lopez-Vergara et al., 2012; Read, 2012), safe sex (Newby et al., 2013), and gambling (St-Pierre et al., 2013). One study focusing on academic aspects of outcome expectancy found that increasing high self-efficacy and outcome expectancy in low-performing students improved undergraduate students' English course performance (Elboroloy & Al Thenyan, 2020). Another study on high school students enrolled in science and engineering-technology courses reported that students' self-efficacy and outcome expectancy directly impacted their course performance (Han et al., 2021). Notably, student course performance was also impacted by the teachers' self-efficacy and outcome expectancy regarding their own teaching ability—suggesting that student performance in other Science, Technology, Engineering, and Mathematics (STEM) courses, such as statistics, could also be enhanced by improving their confidence in their own ability and outcome expectation related to those courses. Another study found that Chinese elementary school students' increased STEM stereotype beliefs negatively predicted their STEM self-efficacy and positive outcome expectancy. Additionally, their STEM self-efficacy and positive outcome expectancy predicted their STEM career interest (Luo et al., 2021).

Three studies have focused on outcome expectancy concerning statistics courses, although they did not study change in outcome expectancy. In one study, outcome expectancy was influenced by perceived controllability and perhaps unsurprisingly, negative outcome expectancy had a negative association with effect on first-year students enrolled in a health sciences statistics course (Budé et al., 2007). In another study, significant predictors of achievement in a psychology statistics course were past academic performance in statistics and positive expectancy (Hood et al., 2012). Finally, self-efficacy has been found to directly affect expectations for performance in statistics (Esnard et al., 2021). Further understanding the association of change in outcome expectancy with other variables and statistics course performance is warranted.

While numerous studies focus on self-efficacy in relation to undergraduate introductory statistics courses, few focus on outcome expectancy about this

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course, and the authors are not aware of any study that focuses on both psychological constructs. Therefore, the current study tracks changes in undergraduate students' academic self-efficacy and outcome expectancy while enrolled in an undergraduate introductory psychology statistics course. We study how these constructs change according to students' academic performance over the course of an academic semester. We include other relevant variables shown to impact academic performance in a statistics course of sex, college year, help-seeking behavior, and academic procrastination as covariates. We predict that students' outcome expectancy will be more resilient to change than their self-efficacy based on their performance in a statistics course and associated covariates. We predict that self-efficacy will change more than outcome expectancy, due to self-efficacy previously being associated with course performance (Hii et al., 2013; McGrath et al., 2015; Waples, 2016). If our prediction is accurate, these results will support the conclusion that self-efficacy and outcome expectancy are not uniformly affected throughout a statistics course, in which students can begin the course with many preconceived fears and anxiety about the topic (Cui et al., 2019; Davis & Mirick, 2015; Esnard et al., 2021; Sloomaeckers et al., 2014). As such, the use of different interventions to address these constructs in students enrolled in statistics courses would be warranted.

Methods

Participants

Participants were undergraduate students enrolled in introductory psychology statistics courses at an urban public college that is part of a large public university system in the Northeast United States. All students who attended class during the first week of the semester were invited to participate. The study was conducted in three introductory psychology statistics course sections, each from a different academic semester. Participation entailed completion of study pre- and post-questionnaires at week 1 (beginning) and week 15 (end) of the semesters. Participants were not compensated nor were they penalized for non-participation. There were 341 students initially enrolled, and 286 students participated for an 83.9% response rate. The study was ethically conducted and received IRB approval. All participants provided informed consent.

Procedure

The course instructor and two research assistants created the self-report questionnaire used in the current study, which inquired about student demographics, academic self-efficacy, academic outcome expectancy, academic help-seeking behavior, and academic procrastination.

Psychological Measurements

Academic self-efficacy was assessed by self-report response to the statement, "I am [was] quite capable of mastering the material in this class." Academic outcome expectancy was assessed by self-report response to the statement, "I will [would] never [be able to] do well in this class" where disagreeing indicates positive outcome expectancy. The past tense of the verb [words included in brackets] was used for the follow-up questionnaire. Both statements utilized a 4-point Likert-type scale with response options of 1 = strongly agree, 2 = somewhat agree, 3 = somewhat disagree, and 4 = strongly disagree.

The self-efficacy item used in this study was influenced by the statistics self-efficacy assessment developed by Hall and Vance (2010), for which they reported a reliability coefficient of 0.92. The statistics self-efficacy item used in this study was inspired by the question in their assessment "How confident are you with solving statistical problems?". To reduce the time and effort for students to respond to the entire survey used in this study, the full statistics self-efficacy assessment by Hall and Vance (2010) was not adapted. Additionally, the number of scale responses for the adapted self-efficacy item was changed from five to four so the response valence would not be obscured by a neutral answer option.

The outcome expectancy item used in this study was adapted from the statistics outcome expectancy assessment created by Hood et al. (2012). Their assessment question, "I expect to do well in this research methods and statistics course", inspired the outcome expectancy item included in this study. To reduce the time and effort for students to respond to the entire survey used in this study, the full statistics outcome expectancy assessment by Hood et al. (2012) was not adapted. The response scale for the adapted outcome expectancy item was reduced from a 7-point to a 4-point response scale to match the self-efficacy item. Hood et al. (2012) reported a Cronbach's alpha of 0.69 for their outcome expectancy assessment.

Variability in participants' responses to the ac-

ademic self-efficacy and outcome expectancy scales was low. For the self-efficacy scale given at the beginning of the course, 28.3% of participants selected “strongly agree,” 64.7% of participants selected “somewhat agree,” 6.6% of participants selected “somewhat disagree,” and 0.3% of participants selected “strongly disagree.” For the self-efficacy scale given at the end of the course, 23.1% of participants selected “strongly agree,” 53.8% of participants selected “somewhat agree,” 19.6% of participants selected “somewhat disagree,” and 3.5% of participants “strongly disagree.” For the outcome expectancy scale given at the beginning of the course, 1% of participants selected “strongly agree,” 3.5% of participants selected “somewhat agree,” 33.9% of participants selected “somewhat disagree,” and 61.5% of participants “strongly disagree.” For the outcome expectancy scale given at the end of the course, 2.1% of participants selected “strongly agree,” 15.4% of participants selected “somewhat agree,” 35.7% of participants selected “somewhat disagree,” and 46.9% of participants “strongly disagree.” Due to this limited variability, responses for both scales were categorized into agree or disagree.

Help-seeking behavior was assessed by self-report responses to the following two questions on the pre-and post-questionnaire: “If you did not understand something in class or got stuck when working on problems outside of class, how likely were you to: (1) Attend a peer tutor session; and (2) Go to the learning center.” Both statements utilized a 4-point Likert-type scale with response options of 1 = very likely, 2 = somewhat likely, 3 = somewhat unlikely, and 4 = never would. Due to the limited variability, responses for those who responded positively to either question (i.e., very likely or somewhat likely) were categorized as self-reported help-seekers while those who endorsed negative responses (i.e., somewhat unlikely or never would) were categorized as non-help-seekers. Kuder-Richardson 20 for the baseline questionnaire was 0.78 and for the follow-up questionnaire was 0.73.

Academic procrastination was assessed by self-report responses to the following four questions on the pre-and post-questionnaire: With regard to academic tasks (e.g., reading for class, completing homework assignments, preparing for exams): (1) To what degree did you tend to delay or procrastinate?; (2) To what degree did you typically have to rush to complete a class-related task on time?; (3) How often did you begin assignments shortly after they are assigned? (reverse coded); and (4) To what degree was procrastination on academic tasks a problem for you? All statements utilized a 5-point Likert-type scale with re-

sponse options of: Item 1: 1 = never procrastinate, 2 = almost never, 3 = sometimes, 4 = nearly always, and 5 = always procrastinate; Item 2: 1 = never rush, 2 = almost never, 3 = sometimes, 4 = nearly always, 5 = always rush; Item 3: 1 = never begin shortly after they are assigned, 2 = almost never, 3 = sometimes, 4 = nearly always, 5 = always begin shortly after they are assigned; and Item 4: 1 = not at all a problem, 2 = a small problem, 3 = a moderate problem, 4 = a large problem, and 5 = a very large problem. Scores on the four items were summed to create a total academic procrastination score, with higher scores indicating a greater tendency to procrastinate. Cronbach alpha for the baseline questionnaire was 0.79 and for the follow-up questionnaire was 0.82.

Course Performance Measurements

Students attended bi-weekly lectures taught by an instructor for 75 minutes per lecture and weekly laboratory sessions led by graduate student instructors for 110 minutes per session. During lecture, the instructor taught students how to use and compute various types of analyses. Each of the three exams, administered during the lecture portion of the class, was semi-cumulative, covered approximately one-third of the course material, and was graded out of 100 possible points. The first examination consisted of multiple-choice questions that tested descriptive statistics, z -scores, correlation, regression, fundamentals of the normal curve, and basic probability theory. The second examination consisted of multiple-choice questions and one hypothesis testing procedure (i.e., complete a t -test by hand) on the principles and steps of hypothesis testing using single sample t -tests, dependent mean t -tests, z -tests, decision errors, effect size, power, and computation of confidence intervals. The third examination consisted of multiple-choice questions and one hypothesis testing procedure covering independent mean t -tests, analysis of variance, chi-square tests, rank-order tests, and specific advanced statistical procedures (e.g., hierarchical multiple regression, factor analysis, structural equation modeling). Examinations were graded objectively by the lecturing professor and a graduate student instructor. Partial credit for hypothesis testing responses was possible and awarded according to an objective scoring rubric.

In the laboratory sessions, graduate student instructors reviewed lecture material, demonstrat-

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ed the use of statistical analysis using IBM SPSS Statistics (IBM Corporation, 2021), and administered weekly quizzes. Additionally, two undergraduate peer tutors, who had previously taken the course and earned high marks, were available for voluntary tutoring for approximately 4-6 hours per week to reinforce course concepts and prepare students for exams. The laboratory grade was computed based on average scores of weekly homework assignments (60%), multiple-choice quizzes (15%), and attendance/participation (25%). Homework assignments and laboratory quizzes were graded objectively by a graduate student instructor according to a detailed scoring rubric. Students' final course grades were calculated based on scores on the three in-class exams (each worth 23%), overall lab grade (26%), attendance during lectures (2%), and a brief in-class presentation (3%).

Statistical Analyses

Descriptive statistics were calculated for the variables with means and standard deviations for the continuous variables and frequency and percentage for the categorical variables. The McNemar test was performed to compare the self-efficacy and outcome expectancy variables from baseline to follow-up on the third exam because it was the performance measure closest in time to follow-up. Multivariate logistic regression was performed to examine the factors that affected the self-efficacy and outcome expectancy variables. IBM SPSS Statistics version 28 (IBM Corporation, 2021) was used for all the analyses. All p -values were two-tailed. Of the 286 participants, nine total students were not included in regression analyses. One student was not included because of missing laboratory quiz grades. Six other students were excluded because they did not respond to all the procrastination questions in the post-questionnaire and two other students were excluded because they did not indicate their current year in college.

Results

Table 1 shows sample descriptive statistics. More than three-quarters (76.6%) of participants identified as female, which could indicate overall increased negative outcome expectancy for course outcomes (van Es & Weaver, 2018). College year was almost equally distributed with approximately one-third for each category, with third-year students representing the largest category. The fourth and other category included fourth-year students ($n=64$), students in a year greater

than their fourth year ($n=11$), those obtaining their second bachelor's degree/non-graduate post-baccalaureate status ($n=2$), graduate students ($n=2$), non-degree-seeking students ($n=3$), and unknown ($n=1$). Toward the end of the semester (i.e., week 15), approximately two-thirds of students reported that they were likely to engage in help-seeking behavior when they got stuck or did not understand course content. Mean exam scores were slightly above 80 for Exam 1, approximately 75 for Exam 2, and slightly above 70 for Exam 3. Mean lab quiz scores were slightly above 80. Mean procrastination scores were approximately 10.4 (lowest score was 4 and highest score was 20), which was slightly above the midpoint of possible scores, slightly tilting in the direction of higher procrastination. Self-efficacy lowered from slightly above 90% of participants at baseline endorsing a statement of feeling capable of mastering course material to approximately three-quarters feeling the same way towards the end of the course. Additionally, outcome expectancy shifted negatively with about 95% of participants expecting to do well at the beginning of the course to slightly above 80% by the end of the course.

Table 2 shows McNemar test comparisons from baseline to follow-up for agreeing with the statistics self-efficacy item, "I am [was] quite capable of mastering the material in this class." For the entire sample, for those who scored below 70, and those who scored below 80 on Exam 3, there was a statistically significant percentage decrease in statistics self-efficacy from baseline to follow-up. There were no statistically significant percentage decreases in reported statistics self-efficacy from baseline to follow-up for those who scored 80-89.9 or 90-100 on Exam 3.

Table 3 shows McNemar test comparisons from baseline to follow-up for disagreeing with the outcome expectancy item "I will [would] never [be able to] do well in this course." In both the entire sample and those who scored below 70 on Exam 3, there was a statistically significant percentage decrease in positive outcome expectancy from baseline to follow-up. There were no statistically significant percentage decreases from baseline to follow-up for those who scored from 70-79.9, 80-89.9, or 90-100 on Exam 3.

Table 4 shows multivariate logistic regression analyses for follow-up of agreeing with the self-efficacy item "I was quite capable of mastering the course material in this class." Higher scores on the first two exams were each

statistically significantly associated with increased odds for high self-efficacy. The other variables were not statistically significantly associated with high self-efficacy.

Table 5 shows multivariate logistic regression analyses for follow-up of positive outcome expectancy. No variables were significantly associated with positive outcome expectancy.

Discussion

In the current study, both high self-efficacy and positive outcome expectancy significantly decreased from baseline to follow-up in univariate analyses for lower-performing students on the third (and final) exam of the semester. In our multivariate analyses, we found that test performance on Exams 1 and 2 was significantly associated with increased odds of high self-efficacy. Positive outcome expectancy, however, was not associated with any of the aforementioned variables; thus, as predicted, outcome expectancy was less susceptible to change throughout the course.

As reported, higher scores on the first two exams were associated with high self-efficacy. This is consistent with previous findings of a moderate correlation between self-efficacy and course performance in statistics (Hii et al., 2013; McGrath et al., 2015; Waples, 2016). Importantly, we found that as performance decreased so did self-efficacy for the course. This was expected, as student performance is positively connected to student confidence (Sucuoğlu, 2018). We did not find a significant association between Exam 3 performance and increased odds for high self-efficacy. We speculate that students adjusted their self-efficacy based on performance on the earlier exams and by the final exam (Exam 3), their self-efficacy was less susceptible to change. In light of this finding, instructors could track critical points where students' self-efficacy decreases, discuss self-efficacy directly at the outset of the course, and provide explicit strategies to enhance self-efficacy in those who are ambivalent or struggling in an introductory statistics course. After all, students with higher self-efficacy are more likely to continue engaging with statistics potentially leading to improved statistics performance (Gopal et al., 2018).

In our univariate analyses, we found a similar pattern for high self-efficacy and positive outcome expectancy. Students who obtained lower Exam 3 scores from 0-69.9 showed decreases in both high self-efficacy and positive outcome expectancy from baseline to

follow-up. Conversely, for those who obtained higher scores of 80 or higher on Exam 3, no statistically significant changes were found for high self-efficacy and positive outcome expectancy from baseline to follow-up. Essentially, self-efficacy and outcome expectancy changed in the same direction as performance on the final exam. These directional changes are expected as students' perceived competence is based on mastery experiences (Bandura, 1986; 1997), including past successes as well as failures (Fong & Krause, 2014). In our multivariate analysis, no variables were significantly associated with positive outcome expectancy. This adds to the mixed findings of previous literature reporting achievement (exam grades) as associated with (Hood et al., 2012) and not associated with outcome expectancy (Budé et al., 2007). However, our finding is similar to the finding of effort (self-reported help-seeking) and outcome expectancy having no significant relationship (Budé et al., 2007; Esnard et al., 2021; Hood et al., 2012).

Limitations

This study has certain limitations. We combined first year with second year students and fourth year with more senior students because our samples of those students were much smaller compared to the number of third year students. Responses to the self-efficacy and outcome expectancy questions were also dichotomized because of limited variability in the responses. Second, self-efficacy and outcome expectancy were each self-assessed by only one item to reduce participant burden (as the current study was part of a larger study of performance in statistics courses). Lengthier and validated measures of statistics self-efficacy, such as Current Statistics Self-Efficacy (CSSE) or Self-Efficacy to Learn Statistics (SELS; Finney & Schraw, 2003) should be used in future research to determine if there are similar patterns as in our study. Third, contextual factors such as sequence of courses, office hour meetings, and prerequisites were not included.

Recommendations

Considering our findings, we recommend that statistics instructors identify students who are at risk for decreasing self-efficacy. Furthermore, instructors should help foster high self-efficacy in students by directly connecting course content to students' everyday lives, incorporating formative low-stakes assessments that may help increase students' mastery experiences (Zientek et al., 2019), training students to employ study strategies (Liao & Wang, 2018), and teaching about

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growth mindset (Samuel & Warner, 2021). Given the anxiety felt by students enrolling in statistics courses, a brief training based on this targeted instruction could be offered to statistics instructors to help them comprehend common pitfalls and psychological variables that could help students navigate such a challenging course.

Researchers found an improvement in statistics performance that correlated with post self-efficacy scores only for undergraduate students who first solved statistics problems in a group setting, in which each member provided explanations for their own answers, gave feedback on the answers and explanations of the other group members, and then solved the same problems again individually with no feedback, compared to students who only solved the problems once, individually, with no feedback (Hall & Vance, 2010). Additionally, they suggested students be provided an explanation of the course material prior to measuring their statistics self-efficacy so that students can give an accurate assessment of their ability. Based on their findings, we recommend that students be given opportunities to compare their statistics problem-solving and answer-choice rationale to their peers' statistics problem-solving and answer-choice rationale in low-stakes assessments. It is also vital that these opportunities be provided numerous times throughout a statistics course so that changes in their self-efficacy and performance remain congruent and improve.

Conclusion

In conclusion, through our multivariate analyses, we found that greater performance on class exams early in the semester was associated with high self-efficacy. Change in positive outcome expectancy was not associated with exam performance. However, lower-performing students demonstrated decreases in both higher self-efficacy and positive outcome expectancy. Self-efficacy was more vulnerable to course performance and strategies to address this should be considered as self-efficacy is a predictor of academic success and achievement in statistics (Johnson & Kuennen, 2006; Mihai-Bogdan et al., 2015; Olani et al., 2011; Ramirez et al., 2012; Walker & Brakke, 2017).

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Table 1

Descriptive Statistics of Sample

Variable	Frequency	Percentage	Mean	Standard Deviation
Sex				
Women	219	76.6%		
Men	67	23.4%		
College year				
First & Second	91	31.8%		
Third	110	38.5%		
Fourth & Other	83	29.0%		
Missing	2	0.7%		
Self-reported help-seekers	191	66.8%		
Self-reported non-help-seekers	95	33.2%		
Exam 1			82.25	12.11
Exam 2			74.53	14.18
Exam 3			71.03	15.85
Lab quiz score (<i>n</i> =285)			81.29	11.75
Procrastination (<i>n</i> =280)			11.35	3.35
Pre-Self-Efficacy (high)	266	93%		
Pre-Self-Efficacy (low)	20	7.0%		
Post-Self-Efficacy (high)	220	76.9%		
Post-Self-Efficacy (low)	66	23.1%		
Pre-Outcome Expectancy (Positive)	273	95.5%		
Pre-Outcome Expectancy (Negative)	13	4.5%		
Post-Outcome Expectancy (Positive)	236	82.5%		
Post-Outcome Expectancy (Negative)	50	17.5%		

Table 2*Comparisons of High Self-Efficacy from Baseline to Follow-Up*

Variable	Statistics Self-Efficacy Baseline Frequency	Percent	Statistics Self-Efficacy Follow-up Frequency	Percent	p-value
Entire Sample (<i>n</i> =286)	266	93.0%	220	76.9%	<0.001
Exam 3 score 0-69.9 (<i>n</i> =126)	114	90.5%	76	60.3%	<0.001
Exam 3 score 70-79.9 (<i>n</i> =67)	66	98.5%	59	88.1%	0.04
Exam 3 score 80-89.9 (<i>n</i> =62)	55	88.7%	55	88.7%	1.00
Exam 3 score 90-100 (<i>n</i> =31)	30	96.8%	30	96.8%	N/A

Note. N/A= not applicable since baseline had 100% agreement.

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Table 3

Comparisons of Positive Outcome Expectancy from Baseline to Follow-up

Variable	Outcome Expectancy Baseline Frequency	Percent	Outcome Expectancy Follow-up Frequency	Percent	p-value
Entire Sample (<i>n</i> =286)	273	95.5%	237	82.9%	<0.001
Exam 3 score 0-69.9 (<i>n</i> =126)	119	94.4%	91	72.2%	<0.001
Exam 3 score 70-79.9 (<i>n</i> =67)	66	98.5%	60	89.6%	0.07
Exam 3 score 80-89.9 (<i>n</i> =62)	57	91.9%	56	90.3%	1.00
Exam 3 score 90-100 (<i>n</i> =31)	30	96.8%	30	96.8%	N/A

Note. N/A= not applicable since baseline had 100% agreement.

Table 4*Logistic Regression Analyses for Follow-up of High Self-Efficacy*

Variable	Odds Ratio	95% Confidence Interval (lower, upper)	p-value
Sex (women)	1.34	0.56, 3.20	0.51
College year			
First & Second	1.00		
Third	0.93	0.38, 2.27	0.88
Fourth & Other	1.20	0.53, 2.71	0.67
Self-reported help-seekers	0.61	0.29, 1.30	0.20
Exam 1	1.05	1.00, 1.10	0.04
Exam 2	1.07	1.02, 1.11	0.002
Exam 3	1.03	1.00, 1.06	0.11
Lab quiz score	0.98	0.95, 1.02	0.39
Procrastination	0.92	0.83, 1.03	0.13
Self-efficacy baseline	0.50	0.14, 1.69	0.26

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Table 5

Logistic Regression Analyses for Follow-up of Positive Outcome Expectancy

Variable	Odds Ratio	95% Confidence Interval (lower, upper)	p-value
Sex (women)	1.07	0.45, 2.55	0.87
College year			
First & Second	1.00		
Third	1.34	0.56, 3.21	0.51
Fourth & Other	2.12	0.93, 4.84	0.76
Self-reported help-seekers	1.07	0.50, 2.30	0.85
Exam 1	1.03	0.99, 1.08	0.19
Exam 2	1.00	0.96, 1.04	0.98
Exam 3	1.03	1.00, 1.06	0.09
Lab quiz score	1.04	1.00, 1.08	0.09
Procrastination	0.95	0.86, 1.06	0.36
Outcome expectancy baseline	3.16	0.83, 12.04	0.09

The Effects of Psychosocial and Traumatic Stressors on MCI Diagnosis

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Background and Objective: Toxic stress exposure can have effects across the lifespan. Studies of civilians and veterans suggest a connection between psychosocial and traumatic stressor exposure in adulthood and a diagnosis of dementia later in life. The objective of this study was to investigate the impact of psychosocial and traumatic stressors on rates of MCI (Mild Cognitive Impairment) diagnosis in Vietnam Era Twin Study of Aging participants. **Methods:** 1,237 twin participants from the VETSA study were aged 61.72 ± 2.44 years at the time of data collection. Traumatic stress was measured by clinical interviewing, with psychosocial stressors quantified by self-report measures. Neuropsychological assessment determined MCI diagnosis. Previously conducted genotyping determined ApoE genotype. Mixed model analysis was used to determine effects on MCI diagnosis. **Results:** Our results from the mixed model analysis did not find a significant relationship between psychosocial and traumatic stress exposure and MCI diagnosis. PTSD diagnosis, measured by the DIS-III-R, collected for the Harvard Drug Study in 1996 ($F = 0.249, p = 0.618$) does not have a significant effect on MCI diagnosis. Life stress exposure, measured by Holmes and Rahe (1967), ($F = 0.249, p = 0.618$) does not have a significant effect on MCI diagnosis. Significant associations were determined using the Type III fixed effects. Associations were considered statistically significant at $p < 0.05$, two-tailed. **Implications:** Few subjects in Wave 2 of VETSA had MCI ($n = 147$), due in part to the age of the participants at the time (Mean $61.72 \pm (2.44$ years)). This led to a lack of power in our analysis. Future studies should examine all available VETSA data.

Keywords: veterans, mild cognitive impairment, psychosocial stress, traumatic stress

There is no single cause of mild cognitive impairment (MCI), a neurodegenerative condition defined as “clinically significant memory impairment that does not meet the criteria for dementia” (Petersen, 2011, p. 2). MCI is an amnesic disorder representing an intermediate stage between normative aging and Alzheimer’s dementia. Though all MCI demonstrate neuropsychological impairment, diagnosis can be broken into subtypes amnesic or non-amnesic (Rountree et al., 2007) for more stable estimates of prevalence and rates of returning to normal cognitive functioning (Jak et al., 2009).

As age increases, so does the risk of developing MCI. A lifetime’s worth of factors and exposures can affect the risk of developing this unhealthy form of cognitive decline. Apolipoprotein genotype (Tang et al., 2023), education (Tervo et al., 2004), and general cognitive ability during adulthood (Corbo et al., 2023) have been associated with an increased risk of developing MCI, but neither the exact causes of MCI nor the influence of a lifetime of stressors is completely understood. There is no known cure for MCI, thus the identification of modifiable risk factors is important for prevention and earlier detection of those at risk. Although research on MCI risk factors is extensive, the identification of the role of stress is incomplete and has never been investigated in a sample of twins.

Exposure to stress in adulthood and midlife has been shown by previous studies to increase the likeli-

hood of an MCI diagnosis on the neurobiological level (Kritikos et al., 2023; Song et al., 2020). Stress occurs during a threat and when environmental demands exceed adaptive capacity, with threat associated external and internal stimuli eliciting the reactions defined as stressors. Potential stressors encountered during adulthood include a long list of adverse psychosocial and physical forces. A psychosocial factor is defined by Hemingway and Marmot (1999) as phenomena that are “potentially related to the social environment and to pathophysiologic changes...Psychosocial factors may act alone or combine in clusters and may exert effects at different stages of the life course” (p. 2). The stressor can be a discrete event such as the death of a spouse, or a prolonged exposure, such as racial discrimination experienced by minority Americans (Turner et al., 2017). In the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-4), Criterion A1, traumatic events are defined as “an event that involves actual or threatened death or serious injury, or other threat to one’s personal integrity” and includes “learning about the unexpected or violent death, serious harm, or threat of death or injury experienced by a family member or other close associate” (First et al., 2004, p. 14).

Posttraumatic stress disorder (PTSD) is a disorder that can be present at any age. It is triggered by either witnessing or experiencing an event that presents a threat to one’s safety. Symptoms may include flashbacks, nightmares, severe anxiety, and uncontrollable

thoughts about the event (Hathaway et al., 2010). It is also associated with cognitive impairments unique to the condition in the domains of verbal learning, speed of information processing, attention, working memory, and verbal memory (Scott et al., 2015). A neurobiological pathway has been proposed to describe how PTSD influences dementia, with traumatic exposure triggering persistent over-activation of the hypothalamic-pituitary-adrenal (HPA) axis and the adrenergic system (Leister & Menke, 2020).

The literature on the impact of psychosocial and traumatic stress on MCI outcomes has been mixed. A study by Wang et al., (2018) of non-military elders of both sexes found a significant dose-dependent relationship between PTSD symptom severity and developing dementia later in life. A study by Peavy et al., (2009) also found that chronic stress and stressful life events led to general memory decline in cognitively normal (CN) individuals as well as those diagnosed with MCI. As for conversion from CN to MCI, Peavy et al., (2012) did not find an association between stressful experiences and change to MCI. These findings could result from the variability of ways that stress and PTSD were operationalized.

Although research with elderly veteran participants varies from that of elderly civilian participants, most VETSA participants were not exposed to combat (Kremen et al., 2013). However, veterans are exposed to factors that are unique to military service (Sibener, 2014). In a study of 181,093 elderly veterans by Yaffe et al. (2010), the 7-year cumulative incident dementia rate amongst veterans with PTSD was 10.6% while those without PTSD had a rate of 6.6%. While Yaffe et al. (2010) did not specify the veterans' era, in another study greater incidence of MCI was observed specifically in Vietnam Era veterans who had also been diagnosed with PTSD (Weiner et al., 2017).

Previous studies have indicated that psychosocial factors such as racism (Moon et al., 2019), workplace adversity (Nabe-Nielsen, et al., 2019), and divorce (Eriksson, 2015) are risk factors for dementia. But in a meta-analysis of 24 longitudinal studies examining categories of toxic psychosocial and trauma-related stress, Bougea et al. (2022) found suggestive, yet non-robust evidence that psychosocial and traumatic types of stress are associated with increased risk of dementia in later life.

As VETSA participants have aged, the focus of the multi-institutional VETSA study has shifted from

a focus on substance use to early identification of risk for MCI and Alzheimer's disease (AD). VETSA participants are all part of the Vietnam Era Twin Registry. VETSA selection criteria were (1) being in one's fifties at the time of recruitment and (2) that both twins in a pair had to be willing to participate in the baseline assessment (Kremen et al., 2013). A narrow subject age range of participants enhances VETSA's ability to examine within-individual differences and change over time. Another key aspect of the study design was an extensive neuropsychological test battery. The study is also unique in that we have cognitive assessment scores from participants when they were inducted into the military at the age of 17 to 25 years old. The present study was designed to investigate the influence of psychosocial and traumatic stressors on MCI diagnosis. It is hypothesized that participants with exposure to psychosocial and traumatic stressors would be more likely to have developed MCI.

Methods

Participants

VETSA participants were recruited from the Harvard Drug Study (Tsuang et al., 2001). 1,237 twins participated (349 monozygotic pairs, 265 dizygotic pairs, and 9 unpaired). Attrition-replacement participants were included as a subset of the Wave 2 participants. The attrition-replacement participants are twin pairs from the Vietnam Era Twin Registry in the same age range as the returning Wave 2 participants. At Wave 2 of data collection, the mean age of participants was $61.72 \pm (2.44)$ years. All VETSA participants were in the military sometime between 1965 and 1975. The majority did not see combat or serve in Vietnam. The sample was entirely male and 95.4% ($n = 712$) white. Black Americans made up 4% ($n = 30$), Hispanics represented 0.3% ($n = 2$) and 0.3% were missing information on race ($n = 2$). The average lifetime education was $12.4 (\pm 1.3)$ years (see Appendix).

Instrumentation

Holmes and Rahe Stress Scale

Life stressors were measured using the Holmes and Rahe Social Readjustment Rating Scale. The Holmes and Rahe Social Readjustment Rating Scale is a 100-item questionnaire ($\alpha = .8458$), composed of 43 life events. An individual's total score measures the amount of stress the individual has experienced in the past year. The tool has been exten-

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sively studied, and its reliability and validity are well established. Cronbach's alpha for various populations ranges from 0.82 to 0.90 (Holmes & Rahe, 1967).

DIS-III-R

Subjects were interviewed using the Diagnostic Interview Schedule Version III Revised (DIS-III-R), a structured interview employed in epidemiological research. Interviews were performed over the telephone by the Institute for Survey Research at Temple University. Responses to the DIS-III-R were used to diagnose psychiatric disorders according to the revised third edition of the Diagnostic and Statistical Manual of Mental Disorders (Coopers and Michels, 1988).

PTSD Checklist (PCL-R)

The PTSD Checklist (PCL) is a self-report rating scale for assessing posttraumatic stress disorder. It consists of 17 items ($\alpha = 0.87$) which correspond to the DSM-III symptoms of PTSD. Examinees are instructed to indicate how much they have been bothered by each symptom in the past month using a 5-point (1-5) scale. The anchors for the severity ratings range from "Not at all" to "Extremely." The PCL can be used as a continuous measure of PTSD symptom severity by summing scores across the 17 items.

AFQT

The Armed Forces Qualification Test (AFQT) is a 50-minute paper-and-pencil test consisting of 100 multiple-choice items ($\alpha = .88$) that was administered just prior to military induction (Bayroff & Anderson, 1963). The items equally represent the four domains of vocabulary, arithmetic word problems, knowledge of tools and mechanical or electrical equipment, and spatial visualization, which involves matching folded and unfolded box patterns (Uhlener & Bolanovich, 1952). Originally intended as a measure of military trainability, further research has found the AFQT to be a highly g-loaded test (Orme et al., 2001), with g being the construct of general intelligence (Humphreys, 1979). VETSA investigators received permission from the United States Department of Defense to re-administer a version of the AFQT that is similar to the AFQT versions that had been administered to VETSA subjects just prior to their induction into the military (1965–1975). This version has been used in previous research (Grafman et al., 1988). Scores from the time of induction are also available to VETSA investigators.

Genotyping

ApoE genotype is integral in AD and MCI re-

search as it accounts for as much as 50% of the attributable risk for AD in many populations (Ashford, 2004). As per Lyons et al. (2013), ApoE genotyping was conducted for the 1,237 VETSA participants at either the Boston University or University of California, San Diego site. ApoE genotype was determined using previously described conditions (Emi et al., 1988; Hixson & Vernier, 1990). Due to the low rate of participants that possessed e4 allele, homozygous and heterozygous carriers were grouped.

Jak-Bondi MCI

This study uses VETSA data that utilized the Jak-Bondi (Jak, et al., 2009) operationalization of MCI. Conservative criteria were used in VETSA, such that it requires impairment on two measures within a domain, with impairment identified as 1.5 *SD* below normative data (Jak et al., 2009). According to these standardized criteria, individuals in VETSA were classified as normal if, at most, performance on one measure within one or two cognitive domains fell more than 1.5 *SD* below age-appropriate norms.

Procedure

Mixed modelling was used to test the association between demographic factors, psychosocial and traumatic variables, and MCI diagnosis.

All analyses were conducted in SPSS 29.0.0.0. All measures were assessed at the individual level. Because our sample consisted of twins, we used a linear mixed modelling approach to account for the clustering of twins within families by including a family ID variable as a random effect. Separate analyses were performed for each measure. Standardized scores were used for all outcome measures and for AFQT, education, and performance on neuropsychological tests.

Model 1 tested whether age at testing date for Wave 2 (61.72 ± 2.44 years) had an effect on MCI outcome. Model 2 tested the association of intelligence, as measured by AFQT performance upon military induction (collected between 1965–1975) with MCI outcome. Model 3 tested the association of ApoE e4 allele status on MCI outcome. Model 4 examined the correlation between years of education on MCI outcome. Model 5 tested the association of race on MCI outcome. Model 6 tested the association of ethnicity (Hispanic/Non-Hispanic) on MCI outcome. Model 7 tested the association of PTSD diagnosis at Harvard Drug Study (Tsuang, et al., 2001) data collection date (1996) as measured by the DIS-III-R on MCI out-

come. Model 8 tested the association of psychosocial stressors over the last two years before the Wave 2 testing date on MCI outcome. Model 9 tested the association of PTSD symptoms at Harvard Drug Study (Tsuang, et al., 2001) data collection date (1996), as measured by the DIS-III-R collection on MCI outcome. Significant associations were determined using the type III fixed effects. Associations were considered statistically significant at $p < 0.05$, two-tailed.

Results

Table 1 shows that Age ($F = 3.879$, $p = 0.05$) did not have a significant effect on MCI diagnosis, although it exhibited a trend towards a predictive effect. Intelligence, measured by the AFQT taken between ages 18-25, was found to have no significant impact on MCI diagnosis ($F = 3.523$, $p = 0.061$). The ApoE e4 allele(s) status ($F = .236$, $p = 0.628$) was also found to have no significant impact on MCI diagnosis. Education, however, ($F = 4.667$, $p = 0.031$) was found to have a significant effect on MCI diagnosis. Neither Race ($F = 2.195$, $p = 0.139$), nor Ethnicity ($F = 2.252$, $p = 0.134$) had a significant effect on MCI diagnosis. PTSD diagnosis, as measured by the DIS-III-R (Coopers and Michel, 1988), collected for the Harvard Drug Study in 1996 ($F = 0.249$, $p = 0.618$) did not have a significant effect on MCI diagnosis. Life stress exposure, as measured by the Holmes and Rahe (1967), ($F = 0.249$, $p = 0.618$) also did not have a significant impact on MCI diagnosis. Lastly, Table 1 shows that PTSD symptoms ($F = 0.006$, $p = 0.936$) did not have a significant impact on MCI diagnosis.

Discussion

Our findings in a mixed model analysis of VETSA Wave 2 did not support the hypothesis. No significant associations between the stress factors we examined and MCI diagnosis in Wave 2 was observed. A significant relationship between education and MCI was observed, but is not surprising, as epidemiological studies consistently report that a high level of education is associated with a reduced risk of cognitive impairment (Anttila et al., 2002; Fratiglioni & Wang, 2007; Ngandu et al., 2007). The results of these studies indicate that education might reflect the extent of early cognitive stimulation of the brain which may influence global cognitive abilities. The average lifetime education of the participants was 12.4 (± 1.3 years; see Appendix A).

Previous studies investigated the relationship between psychosocial and traumatic stressor activities with cognitive decline. We hypothesize that our results may vary from those obtained by Yaffe et al. (2010) because their study tracked health records over a period of seven years, while our analysis looked at new MCI diagnoses over a shorter time span between each VETSA data collection point. Further, their subjects were more racially diverse and included women. Our study only investigated the onset of MCI, while their study included all types of dementias, including end-stage Alzheimer's Disease. Most importantly, the mean baseline age of their veteran subjects was 68.8 years.

The study by Weiner et al. (2017) primarily aimed to establish the relationship between traumatic brain injury, PTSD, and Alzheimer's Disease biomarkers. Their study's conceptualization of PTSD may have been more relevant to finding the connection between traumatic exposure and cognitive impairment, as it accounted for current and lifetime PTSD instead of PTSD status at one point in 1996. Another feature of their study that contributed to their finding was that their subjects had a mean age of 67.8.

As for Peavy et al. (2009), their operationalization of MCI was the less stringent Peterson et al. (1999) criteria. In one study by Oltra-Cucarella et al. (2018) criteria for MCI misclassified 24% of the sample compared to the more conservative Jak-Bondi MCI criteria (Jak et al., 2009) used for the current study. Stress was also measured as a cortisol rating and from responses to the Life Events and Difficulties Schedule (Brown & Harris, 1978), which quantified events over the participants' entire adult life instead of within the last two years before the study visit. Stressful events were also self-reported every six months, at which time cortisol was measured. This data was collected for two to three years. Aside from this difference in operationalization of toxic stress, the mean age of participants was 78.8 years old, making their participants much older than ours.

Wang et al. (2018) studied non-military elders and found a significant dose-dependent relationship between PTSD symptom severity and developing dementia later in life. Though the average age of their participants was 55.44 years, PTSD severity was indicated by the frequency of psychiatric clinic visits for PTSD. This operationalization of PTSD is not through clinically supported or uniform diagnosis criteria. As for psychosocial and trauma-related

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stress, Bougea et al. (2022) may have found results that differed from ours because they used a wide variety of conceptualizations of psychosocial stress. For dementia diagnosis, one included study used self-report responses to quantify dementia. All participant data examined was for people 65 years or older.

One of the main limitations of the current study was the small number of people that met the diagnostic criteria for MCI, which in total was only 147 after adjusting for age, education, and practice effects. This small number resulted in a lack of statistical power. Additional issues with the analysis may be from our operationalization of psychosocial and traumatic stressors. The measure of psychosocial stress used, the Holmes and Rahe (1967), only pertained to the two years of the participant's life prior to test administration. A measure that accounts for the entirety of adulthood, from 18 years old onwards, would more accurately quantify the total adult stress burden. As for using the PTSD diagnosis conferred in 1996, the literature supports that just one incidence of PTSD permanently alters the brain (Hendrickson & Raskind, 2016). The mechanism is that trauma causes permanent neuronal changes that harm learning, habituation, and stimulus discrimination. Some of these neuronal changes that have a continuing impact do not even depend on actual exposure to reminders of the trauma for expression (Van der Kolk, 2003). Even so, a diagnosis back in 1996 may not be as relevant to cognitive status during the data collection period of VETSA Wave 2, which occurred in the 2010's (between 2009 and 2014).

Our insignificant findings are still relevant to MCI risk factor research. Our limitations highlight the importance of subject selection and support existing research on the typical age of onset for MCI (Howieson et al., 2008). Future analyses should be conducted with VETSA study data that covers a longer period of the twins' lives. Future analyses should also include data collected when the participants were older. These two suggestions should be followed so that a longer period of toxic stress exposure can be quantified and so that the subjects will be older, giving more time for MCI to develop. Higher rates of MCI can be expected to emerge as the participants age. The results did not indicate that toxic psychosocial stress exposure and/or traumatic stress had an impact on rates of MCI diagnosis within a subject pool of veterans from the VETSA study. Monitoring the health of veterans as they age is

important for addressing the epidemic of cognitive impairment in the general population. Even those with primarily non-combatant roles are at risk for adverse health outcomes due to their service. Veterans have made great sacrifices and the scientific community must ensure that their unique healthcare needs are met.

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STRESSORS ON MCI DIAGNOSIS

Table 1

Mixed Model Tests of Fixed Effects on MCI Diagnosis

Predictor Variable	Effect Size	<i>df</i>	<i>F</i>	Sig.
Intercept	-.0996630	424.991	.033	.855
Age	.012825	354.861	3.879	.050
Intelligence (AFQT)*	.041172	611.258	3.523	.061
APOE4 Genotype**	-.015053	494.713	.236	.628
Education	-.014630	627.474	4.667	.031
Race	-.083152	464.379	2.195	.139
Ethnicity (Hispanic/Non-Hispanic)	.095098	394.071	2.252	.134
PTSD Diagnosis***	-.006674	651.445	.056	.813
Life Stress Exposure****	.002229	667.789	.249	.618
PTSD Symptoms***	-.000481	656.508	.006	.936

Note. Dependent Variable: MCI diagnosis at VETSA Wave 2.

*at ages 17–25 years, as measured by the AFQT upon military induction between 1965–1975, collected for the Harvard Drug Study

**no e4 allele vs. homo- or heterozygous for e4

*** as measured by the DIS-III-R, collected for the Harvard Drug Study in 1996

**** measured over the last two years from testing date by the Holmes and Rahe (1967).

Appendix A

VETSA subjects (Total $n = 746$)	
Age at induction (years)	19.9 ± 1.4 (17—25) ($n = 746$)
Race	
White	95.4% ($n = 712$)
Black	4.0% ($n = 30$)
Hispanic	0.3% ($n = 2$)
Missing	0.3% ($n = 2$)
Marital status in 1991—1993	
Married	78.3% ($n = 584$)
Single	8.3% ($n = 62$)
Widowed	0.7% ($n = 5$)
Separated	1.9% ($n = 14$)
Divorced	10.9% ($n = 81$)
Education at induction (years)	12.4 ± 1.3 (7—20) ($n = 740$)

Note. Subject demographic data from Lyons et al. (2013).

Can Induced Awe Reduce Anti-Gay Prejudice in Heterosexual Adults and Does the Need for Closure Moderate this Effect?

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With sexual prejudice continuing to be widely prevalent and seriously harmful, there is a need to find ways to reduce anti-gay prejudice (AGP). This online experimental study examined if a novel intervention, induced awe, can reduce AGP; if those high in need for closure (NFC) show higher AGP; and if NFC moderates the effect of awe on AGP. In total, 154 heterosexual adults completed the Need for Closure Scale (Roets & Van Hiel, 2011) before being randomly assigned to one of three emotion induction interventions – 1) watching a 4.43 min long video of the target emotion, awe, 2) watching the comparison emotion, amusement, or 3) watching a neutral emotion as a control. Post intervention, the participants completed the explicit measures Homosexuality Attitudes Scale (HAS; Kite & Deaux, 1986). Data were analysed using a 2 (NFC) x 3 (emotion type) independent factorial ANOVA. None of the three hypotheses were supported since there were no main effects of awe or NFC on AGP, and no interaction effect of awe and NFC on AGP. Key implications of these results were 1) awe induction does not change prejudicial attitudes at an explicit level (Dale et al., 2020), 2) factors beyond NFC, like Right Wing Authoritarianism (RWA) and Social Dominance Orientation (SDO), may influence the effectiveness of awe in reducing prejudice, and 3) questions were raised about certain boundaries for awe's effectiveness. Methodological modifications suggested for future research include using implicit measures or veiled elicitation methods for authentic measurement of AGP, employing more potent awe elicitors, and assessing the mediating role of RWA and SDO on the effect of NFC on AGP.

Keywords: anti-gay prejudice, induced awe, need for closure, Need for Closure Scale, Homosexuality Attitudes Scale, sexual prejudice

Despite decades of struggle, prejudice based on sexual orientation continues to be commonplace (Bartos et al., 2014; Pirlott & Cook, 2018). Homosexual people face rejection at three levels– the socio-political level (heterosexism), the cultural level (sexual stigma) and the individual level (anti-gay prejudice (AGP) or sexual prejudice; Herek, 2007). On a socio-political level, as of December 2020, 70 countries worldwide still criminalised homosexuality and in 11 of those countries, homosexual behaviour could warrant a death penalty (International Lesbian, Gay, Bisexual, Trans, and Intersex Association, 2020). On a cultural level, a major contributor to stigmatization of homosexuality has been the 'scientific' rationalization given by the Psychology and Psychiatry disciplines for treating homosexuality as a mental disorder (Drescher, 2015). The American Psychiatric Association (1987) completely removed homosexuality as a mental disorder as late as 1987, in its revised third edition of the Diagnostic and Statistical Manual of Mental Disorders, and the World Health Organisation (1990) removed homosexuality from its International Classification of Diseases in 1990. On an interpersonal level, homosexuals continue to battle various forms of harmful prejudicial behaviors like verbal harassment, physical assault, sexual assault, social avoidance, and social distancing (Huebner et al., 2004). Sexual prejudice was the cause for 17% of hate crimes commit-

ted in 2019 in the United States (Federal Bureau of Investigation, 2019). Despite the ethical obligation that the discipline of Psychology has, to find effective ways of reducing sexual prejudice, this field of research continues to be very small (Case & Stewart, 2010).

Interventions to Reduce Anti-gay Prejudice

According to a meta-analytic review of interventions to reduce sexual prejudice (Bartos et al., 2014), only education and contact with gay people have shown a reasonable medium sized effect. Education is a rational confrontational intervention that can sometimes work and sometimes backfire (Cramwinckel et al., 2021) because prejudice has underlying emotions that are often resistant to rational argument (Dovidio et al., 2004) and those who identify strongly with their ingroup are likely to feel that their ingroup is being made to look guilty with the educational intervention and to respond with increased hostility towards the outgroup (Doosje et al., 1998). The general findings of intergroup contact research are more promising (Pettigrew & Tropp, 2000; 2008). However, many psychologists (e.g., McKeown & Dixon, 2017; Vezzali & Stathi, 2020) caution against its real-world applicability because the idealized interactions that psychologists study are very different from actual interactions in real-life settings (Paluck & Green, 2009). Other limitations of intergroup contact interventions are: 1) the effects of contact vary significantly across dif-

ferent types of contact - positive or negative (Vezzali & Stathi, 2020); 2) such effects lack generalizability, since most studies have been done with people under the age of 25 and the effects of contact are not measured for longer than a day (Paluck and Green, 2009); and, 3) the model hopes to psychologically rehabilitate dominant bigots (McKeown & Dixon, 2017).

Allport's (1954) intergroup contact hypothesis, said that four conditions must be met for intergroup contact to effectively reduce prejudice: equal status, common goals, intergroup cooperation and support of authorities, and laws and customs. While many subsequent studies have shown that even when all four of the conditions are not met there is still a reduction in prejudice seen (Pettigrew & Tropp, 2000), many critics have shown that in real life, intergroup contact can increase prejudice instead of decreasing it (McKeown & Dixon, 2017; Graf et al., 2014). Another less researched prejudice reducing intervention is elicitation of emotions like empathy toward a discriminated group (Paluck & Green, 2009). However, its effect on reducing sexual prejudicial attitudes has only shown modest results (Bartos et al., 2014). There is a need for psychologists to test other forms of interventions for reducing AGP.

Awe

Awe is an emotional response to exceptionally vast stimuli and events, like the beauty and vastness of nature, certain forms of art, ability, perfection, and supernatural events, that defies one's accustomed frame of reference in some domain, transcends one's current understanding (Shiota et al., 2007), and requires an accommodation/adjustment to existing mental structures (Keltner & Haidt, 2003). Awe is a unique emotion that has shown widespread effects on increasing an individual's prosocial behavior (Piff et al., 2015), as well as on reducing conviction about one's ideological attitudes (Stancato & Keltner, 2021). Experience of positive awe has two kinds of effects. One type is where awe changes the patterns of sociality with reduced focus on self and increased feeling of being small or insignificant (Bai et al., 2017; Stellar et al., 2018), thereby leading us to see ourselves as a small part of a greater whole, more connected to humanity, including out-group members (Shiota et al., 2007).

The second type of effect of awe relates to how its experience is cognitively destabilizing and triggers the need for accommodation (Rudd et al. 2012; Valdesolo et al., 2016). Experiencing awe-inspiring

phenomena involves challenging one's current mental structures (Keltner & Haidt, 2003), and searching for new knowledge structures to make sense of new experiences, leading to schema change (Shiota et al., 2007). Although Dale et al. (2020) did not find support for a schema change with regard to negative racial attitudes toward African Americans, Stancato and Keltner (2021), across three experimental studies, did find robust support for it as a result of experiencing induced awe. Stancato and Keltner (2021) tested the effects of experimentally induced awe on reducing conviction about one's ideological attitudes related to racism and found that induced awe led to uncertainty and ambivalence regarding one's attitudes towards ideologically opponent outgroups and that in turn promoted reduced dogmatism and increased perceptions of social cohesion. There are many theoretical positions (for example Allport, 1954; Adorno et al., 1950; Sidanius et al., 2004), that suggest that many kinds of prejudice, like racism, sexism, and sexual prejudice, share similar characteristics (Aosved et al., 2009). So, theoretically if inducing awe can reduce racially prejudicial attitudes, it should be effective in reducing sexually prejudicial attitudes as well. However, no one has tested this effect yet. This study's first objective was to test the effect of inducing awe on the reduction of AGP in heterosexual adults.

Need for Closure

In his seminal work 'The Nature of Prejudice', Allport (1954) theorized that individuals with a prejudice-prone personality think of anything and everything in a prejudicial way. They have a motivated general way of thinking, that does not discriminate between different outgroups and holds prejudice against all kinds of targeted groups. A more contemporary theory that also supports Allport's (1954) theory of prejudiced personality is the need for closure (NFC) theory posited by Kruglanski and Webster (1996; also see Kruglanski & Fishman, 2009) which explains the individual differences behind prejudicial thinking. Therefore, NFC is a cognitive style that predicts prejudicial attitudes (Onraet et al., 2011; Roets & Van Hiel, 2011).

NFC has been defined as the desire for "an answer on a given topic, any answer, compared to confusion and ambiguity" (Webster & Kruglanski, 1994, p. 1049) with two underlying tendencies - seizing (seeking quick and definite answers sourced through easily accessible information) and freezing (freezing upon those

answers and guarding them against any contradictory information). Individuals high in dispositional NFC desire order and structure in their lives, predictable knowledge that is stable across circumstances, and swift and firm decisions. They are uncomfortable with ambiguity and are closed-minded, unwilling to have their knowledge challenged (Webster & Kruglanski, 1994).

NFC theory explains why people with high dispositional NFC experience discomfort with situations and people that seem to deviate from expectations and norms, and therefore hold negative attitudes toward a wide variety of marginalized groups (Roets & Van Hiel, 2011), including homosexuals (Soenens et al., 2005). In three Belgian studies, Van Hiel et al. (2004) found support for a structural equation model in which NFC had a positive effect on racism which was fully mediated by Right Wing Authoritarianism (RWA) but only partially by Social Dominance Orientation (SDO). Similarly, Baldner and Pierro (2019) found a significant positive correlation between NFC and prejudice against immigrants in Italy and in the United States. Soenens et al. (2005) conducted a study in Belgium with 393 psychology students, examining the relationship between different identity styles and measures of conservatism, and racial and sexual prejudice. As a part of that study, they found that NFC positively correlated with other measures of conservatism (RWA and SDO) and prejudice (racism and anti-gay prejudice). The second objective of this study was to find support for the idea that individuals high in NFC display higher AGP.

Moderating Role of NFC on the Effect of Awe on Anti-gay Prejudice

While Allport (1954) posited that prejudice reducing interventions, like intergroup contact, don't work on prejudice-prone personalities because of the rigidity of their attitudes, contemporary researchers (Dhont et al., 2011; Hodson, 2008) found evidence to the contrary. Dhont et al. (2011) conducted a series of five studies among Flemish Belgian students and adults testing if NFC moderates the relation between intergroup contact and prejudice toward Muslim immigrants. The results consistently showed that intergroup contact was more strongly associated with reduced levels of racial prejudice among people high in NFC compared to people low in NFC. Aosved et al. (2009) found strong correlation between the constructs of racism, sexual prejudice, sexism, ageism, classism, and religious intolerance,

lending credence to the idea that NFC's effects on racial prejudice and sexual prejudice would be similar.

One evolutionary function of awe is to generate a need for accommodation and updating of current mental frameworks, and to make sense of new information that cannot be assimilated in current mental structures (Griskevicius et al., 2010) – needs people are generally motivated to satisfy (Fiedler, 2001). The other function of awe is to increase the prosocial tendencies in people via a sense of 'small self' - seeing oneself as less important in the grand scheme of things (Piff et al., 2015). When faced with situations and people that defy conventions and norms, like homosexuals, people with high NFC (vs. low NFC) have a greater and more urgent need for cognitive accommodation (Dhont et al., 2011; Van Hiel & Mervielde, 2002). Since awe is known to increase prosocial tendencies, we expected the experience of awe to help resolve this heightened need for accommodation in favour of reduced anti-gay bias. Although dispositional tendencies to experience awe are negatively associated with NFC (Shiota et al., 2007), awe can be induced in individuals who are or aren't predisposed to experiencing it, and its effects can last up to a week or longer after the experience (Anderson et al., 2018; Takano & Nomura, 2020).

By combining findings from the awe, NFC, and sexual prejudice literatures, we expected that NFC would play a moderating role in the effect of awe on AGP, in such a way that people high in NFC would respond to experience of awe with a greater reduction in AGP. To overcome prior study limitations of most studies being correlational, conducted in the United States and among college students, this study was designed to be experimental, conducted among heterosexual adults in the age range of 18 to 87 years, with participants from many countries (including the United Kingdom, Canada, United States, Europe, and India). This study's aim was to explore a new line of research related to the use of a novel emotional stimulus, awe, to reduce AGP, especially among high NFC/prejudice-prone people, which has not been conducted to date.

Hypotheses

H1: People who have awe elicited within them will report a larger decrease in anti-gay prejudice than people who experience amusement or neutral emotion.

H2: People high in need for closure will show higher anti-gay prejudice than people low in

need for closure.

H3: There will be an interactive effect of induced emotion and need for closure on anti-gay prejudice, such that the relatively beneficial effects of awe induction (relative to amusement and neutral emotion induction) on anti-gay prejudice should be greater for those high in need for closure than those low in need for closure.

Method

Design

This was an online experimental study with data collected via Qualtrics. This experimental study had an independent measures 2 x 3 factorial design. IV1 'emotion type' was a three level, between-subjects factor where awe, amusement, and neutral emotion types were induced by using three different 4.43-minute-long video stimuli. IV2 'NFC' was a measured factor, split at the time of analysis into two levels – high NFC (above median) and low NFC (below median). The DV was the anti-gay prejudice score. Overall, we aimed to examine 1) the effects of a 4.43 min. awe video (vs. 4.43 min. 'amusement video' – a comparison positive emotion, and a 4.43 min. 'neutral emotion' video – as control) on AGP, 2) the effect of NFC on AGP, 3) the interaction effect of induced emotion type and NFC on AGP.

Participants

The G*Power estimate for the number of participants required for this study was 158 (Power 0.8, effect size 0.25, Alpha error probability 0.05). A total of 159 self-identified heterosexual adults were recruited for this online study – 90 (57%) through Survey Circle (a research participant recruitment website), 57 (36%) through social media platforms (Facebook, LinkedIn, and WhatsApp groups of family and friends), and 12 (7%) through the Research Participation Scheme (RPS) and the MSc. Psychology student community at University of Derby. Participants recruited through Survey Circle and RPS received points for participating in this study, which counted towards their research credit. No other participants received any incentives. Individuals who were not fluent in English, were <18 years of age, or did not self-identify as heterosexual were excluded from this study. Five outlier cases, with z-scores higher than +/- 2.58, were removed from the analysis to improve the conditions of normality in the data set. Remaining participants ($n = 154$) ranged in

age from 18 to 87 ($M = 35$, $SD = 14.5$) and 71% were female and 29% were male. The participant data had a strong skew towards younger age groups with modal age of 23 years and 50% of respondents being under 30 years of age. The sample was geographically heterogeneous, having 50 (32.5%) respondents from the United Kingdom, 42 (27.3%) from India, 21 (13.6%) from Canada, 16 (10.4%) from Europe, 13 (8.4%) from the United States, and 12 (7.8%) from other countries.

Materials

The materials used in this study were a Qualtrics account to host the survey, SPSS to conduct the planned analysis and Student OneDrive to store the participant data. The experiment stimuli used were three previously validated videos, all related to nature, and all edited to the same duration of 4.43 min. Awe video stimulus https://www.youtube.com/watch?v=RUp_P2g8sAc previously used by Piff et al. (2015), consisted of nature clips from the BBC's Planet Earth series with grand, awe-inspiring shots of scenic vistas, mountains, plains, forests, and canyons. Amusement video stimulus <https://youtu.be/osQoYz2cIGU>, captured amusing moments from the daily life of Antarctic penguins, and had been previously used by Yichao et al. (2021). The neutral emotion type video stimulus <https://www.youtube.com/watch?v=8YFK-djtLozc>, was a short documentary about goby fish, previously validated and used by Valdesolo et al. (2016) and found to be devoid of strong emotional responses.

Measures

NFC was measured with the 15-item short version (Roets & Van Hiel, 2011) of the NFC scale (Webster & Kruglanski, 1994; revised by Roets & Van Hiel, 2007). Sample items included "I don't like to go into a situation without knowing what I can expect from it" and "I would quickly become impatient and irritated if I would not find a solution to a problem immediately." Respondents completed the items on a 6-point scale from 1 (completely disagree) to 6 (completely agree), and responses across items were averaged such that higher scores would indicate higher levels of NFC. This study obtained a Cronbach's alpha of .84. For this version of the NFC scale, Roets and Van Hiel (2011) obtained Cronbach's alpha of .87, demonstrating good internal consistency.

Homosexuality Attitudes Scale (HAS; Kite & Deaux, 1986) consists of 21 items assessing people's stereotypes, misconceptions, and anxieties about

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homosexuals. Sample items include “Homosexuals should be forced to have psychological treatment” and “If I were a parent, I could accept my son or daughter being gay”. Respondents rate each item on a 5-point Likert scale ranging from ‘strongly agree’ to ‘strongly disagree’. The scale provides a unidimensional factor representing attitudes toward gay individuals and reported high internal consistency ($\alpha > .93$) and good test-retest reliability ($r = .71$). Cronbach’s alpha for this study was .95. A higher score on HAS represents a more favourable evaluation of homosexuals. The HAS has previously been utilized as a measurement to assess beliefs about homosexuals in several studies, for example, Keiller (2010).

Procedure

This study was approved by the ethics review panel at the University of Derby. Subsequently, participants were recruited using a variety of methods including Survey Circle, social media and University of Derby student platforms (details in Participants section above). The study was posted on these platforms using the Participant Invitation, which included the digital URL and QR code for the Qualtrics webpage where the study was hosted. Those interested in taking part in the study were invited to click on the URL or scan the QR code to access the virtual Participant Information Sheet which provided the details about the research aims and overview, and what they would be required to do if they decided to participate in the study. The Participant Information Sheet also stated that participation in the study was completely voluntary, anonymized, that there was an option to ‘opt out’ of the study anytime during or up to two weeks after their participation in the study, prior to the data analysis taking place, and that participants would be provided with a unique identifier code in order to withdraw. There was no reward or monetary benefit for participation, except those recruited via the RPS and Survey Circle who received points in the respective research participation schemes. There were no attempts to deceive the participants. Participants were informed of the approximate length of the study (15-20 minutes). This was followed by the GDPR regulations and Privacy notice. Once the candidates had thoroughly read the information sheet and the Privacy notice, they were asked to provide their consent in an Informed Consent Form. The consent form had a box the participant had to tick be-

fore continuing, confirming their informed consent.

Participants were then directed to the next section asking the following demographics – age, gender, and country of residence. After completing the demographic section, they were directed to the first task which was responding to the NFC short version scale. Upon completion of this task, using Qualtrics randomizer, they were randomly allocated to one of three groups – awe/amusement/neutral – and were asked to view the corresponding 4.43-minute-long emotion eliciting stimuli video. Participants were not able to fast forward or speed up the video at any stage and needed to watch the video in full at regular speed. After participants finished viewing the emotion eliciting stimulus video they were asked to report the intensity of their current emotions out of 14 options - “fear,” “anger,” “sadness,” “pride,” “awe,” “peacefulness,” “excitement,” “happiness,” “boredom,” “anxiety,” “love,” “surprise,” “amusement,” and “disgust” (1 = not at all; 7 = extremely). This emotional manipulation check has been previously used by Piff et al. (2015) and Rudd et al. (2012).

The last task for the participants was to respond to the HAS measuring their attitudes toward homosexual individuals. HAS was administered only once, after the experimental intervention, in line with previous studies using experimental manipulation of awe, for example, Stellar et al. (2018), and Yichao et al. (2021). Once the final task was completed, all participants were taken to the Debrief page and provided re-consent to their data being used by the research team, which concluded their participation in the study. The debrief informed them of the next steps in the study, clearly stating till which point they could withdraw. To do this, participants were going to be asked to provide their unique identification code and state to the researchers that they are no longer interested in participating in the study. They were also informed that upon request they will be able to access the final research paper if desired. Lastly, contact details of the researchers were provided to welcome the opportunity to ask any questions.

Analytic Strategy

Data imported from Qualtrics study were analyzed using SPSS. Outliers (z -scores greater than ± 2.58) were removed. Before conducting a 2 x 3 factorial ANOVA, the data from remaining participants were checked for parametric assumptions. The dependent variable (AGP) data were at interval level.

Since there were many groups in the 2 x 3 design of this study, and because normality of residuals rather than normality of variables is important in ANOVA (Kozak & Piepho, 2018), the residuals for AGP were examined for normality, which showed a deviation from normality. Subsequently, a Log 10 transformation was done on the AGP reflected data, and their residuals showed a normal distribution. Normality was also checked after splitting the data into each of the six (2 NFC levels x 3 Emotion types) IV combinations, each of which also showed a normal distribution. Homogeneity of variance was checked with a Levene's test. A 2 (NFC level) x 3 (Emotion type) factorial independent measures ANOVA was then conducted. Apart from the main analysis, a manipulation check was done to find if the awe stimulus generated higher mean levels of awe emotion as compared to the amusement stimulus and the neutral emotion stimulus, by conducting a one-way ANOVA. Normality and homogeneity of variance assumptions were checked before conducting the one-way ANOVA.

Results

Five univariate outlier cases with z-scores greater than +/- 2.58 were removed from the initial data set of 159 participants – with 3 from AGP data ($z = -3.00, -3.68, -3.00$) and 2 from NFC score data ($z = -2.71, -2.99$), leaving a sample of 154 respondents for analysis. The descriptive and normality test statistics are given in Table 1.

Manipulation Check

To determine whether the awe video stimulus elicited a higher level of awe emotion as compared to the amusement video and the neutral emotion video, an emotion manipulation check was done using a one-way ANOVA. The data were screened for normality assumptions before performing an ANOVA. Histograms and Q-Q plots showed a normal distribution. Inspection of box plots did not reveal any outliers. The z-scores for skewness of awe levels for awe, amusement, and neutral stimuli were -1.67, 1.36 and 0.15 respectively. The z-scores for kurtosis of awe levels for awe, amusement, and neutral stimuli were 1.62, -1.17 and -2.09 respectively - all within the acceptable +/- 2.58 range for a sample size of 154. The K-S and S-W tests being significant suggested the distribution deviated from normal, but ANOVA has been found to be robust enough to account for such small anomalies (Field, 2013). Levene's statistic was

not significant ($p = .34$), so homogeneity of variance was assumed. The descriptive and normality test statistics of data analysed using SPSS are given in Table 2.

A one-way ANOVA was used to examine the effect of the three different emotion stimuli on the level of awe elicited. The results revealed that there was a statistically significant difference in the mean level of awe elicited between at least two groups ($F(2, 151) = 8.35, p = .001$). Tukey's HSD Test for multiple comparisons found that the mean level of awe elicited was significantly different between awe stimulus and amusement stimulus ($p = 0.001, 95\% \text{ CI} = [.63, 2.50]$), as well as between awe stimulus and neutral stimulus ($p = .015, 95\% \text{ CI} = [.18, 2.06]$). Awe video stimulus generated more awe as compared to amusement or neutral video stimuli.

Assumptions Check

Based on the rationale given in the Analytic strategy earlier, the residuals for AGP were examined for normality. While the Zkurtosis (.51/.39 = 1.31) was in the desirable range of +/- 2.58, the Zskewness (-1.22/.19 = -6.42), histogram and Q-Q plots showed the residuals of AGP were not normally distributed. Thereafter, a Log 10 transformation was done on the AGP reflected data and its residuals were examined for normality which showed acceptable Zskewness (.49/.19 = -2.50) and Zkurtosis (1.00/.389 = 2.57) of between +/- 2.58 and close to normal histogram and Q-Q plots. Skewness and Kurtosis were then checked for the residuals of AGP Log 10 transformed reflected data for all six levels of IV conditions (3 emotion types x 2 NFC levels) separately. This too produced Zskewness and Zkurtosis scores between acceptable limits of +/- 2.58. While the residuals of Log 10 transformed AGP reflected data met the requirements of normality for conducting an ANOVA, the Levene's statistic was significant, $p = .014$, showing that homogeneity of variance cannot be assumed, and the results should be interpreted with caution (Field, 2013).

Main Analysis

Results of the factorial ANOVA revealed that, contrary to H1, there was no significant main effect of emotion type on AGP ($F(2, 148) = 0.06, p = .94, \eta p^2 = .001$). In contrast with H2, there was no significant main effect of NFC on AGP ($F(1, 148) = 2.01, p = .16, \eta p^2 = .013$). In contrast with H3, there was no significant interaction effect between NFC and emotion type on AGP ($F(2, 148) = 0.47, p = .62, \eta p^2 = .006$). For all groups, ηp^2 values suggested a small effect size.

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Discussion

In this study we examined if induced awe (compared to amusement or neutral emotions) reduces AGP, if high NFC (vs. low NFC) leads to higher AGP, and if NFC moderates the effect of awe on AGP. The results did not support the first hypothesis since participants in the awe condition did not differ in their reduction of AGP, from those in the amusement or neutral emotion conditions. The second hypothesis was also not supported since participants with high NFC did not significantly differ in their AGP scores from those with low NFC. Also, the results did not support the third hypothesis since no interaction effect of induced awe and NFC was found on AGP.

The finding that an awe-inducing intervention did not reduce AGP stands in contrast with the findings of Stancato and Keltner (2021) who found that induced awe (using similar stimuli as the present study) reduced conviction in attitudes towards racial outgroups. One point of difference between the two studies pertains to the demographic skew in the respective samples. Stancato and Keltner (2021) recruited their sample entirely from Amazon Turk whose respondent pool had a male skew (54% male), older age skew (70% aged >30 years) and had only 22.3% represented by student respondents (Levy et al., 2016). In contrast, the present study had a female skew (71% female), younger age skew (50% aged < 30 years and modal age = 23 years), and a student skew (64% students). Multiple studies have shown that women are less sexually prejudiced than men, and this difference is especially large among college students (Kite & Whitley, 1996). Younger people, especially students who volunteer to participate in sexuality-related research, also have more sexual experiences and less restrictive values than their peers (Wiederman, 1999). College students express less prejudice than an average individual (Judd et al., 1995) and are more aware of modern social proscription against the expression of prejudice (Crandall & Eshleman, 2003). College students have had more exposure to some form of diversity or antibias training (McCauley et al., 2000). This demographic skew of the sample could help explain the present study's significantly more favourable attitudinal responses to homosexuality than expected.

The results pertaining to the first hypothesis were however in line with Dale et al. (2020), who did not find a significant effect of induced awe on reduction of negative stereotypical attitudes toward African Amer-

icans. Dale et al. (2020) posited that individuals may not perceive the effects of induced awe beyond the emotion itself, and the attitudinal shifts that are expected to happen in response to the experience of awe are likely to be outside of conscious awareness thereby impacting only implicit attitudes and not explicit attitudes. Since both Dale et al. (2020) and this study used a prejudice scale measuring explicit attitudes, this may have led to insignificant effects of induced awe on prejudice reduction in both studies. Using scales measuring explicit attitudes could have also led to inauthentic measurement of prejudice in both cases. Specific to this study, another drawback of using an explicit scale for measuring AGP is the assumption that people will explicitly express their prejudice, which does not always happen, because of social desirability reasons (Steffens, 2005). Crandall and Eshleman's (2003) 'justification-suppression model' for prejudice expression posits that because of suppression by social norms people do not directly express their genuine prejudices. When it comes to prejudice, what is felt and what is reported are two different things.

Implicit measures like the Implicit Association Test (IAT) are rarely used in sexual prejudice research, but may provide more accurate results (Banse et al., 2001). In an experiment, Banse et al. (2001) conducted among 79 German students, attitudes towards gays and lesbians were tested using both an explicit scale and an IAT adapted from Greenwald et al. (1998). This study found that participants faked explicit attitudes (which were very positive) but could not fake implicit attitudes (which were relatively negative). In another study, Coffman et al. (2016) found that widely used explicit measures of anti-gay sentiments produce significant underestimation in existing surveys because of social desirability, even when responses are private and anonymized. Coffman et al. (2016) conducted an experiment where 2,516 U.S. participants were randomly assigned to either a "best practices method" that was computer-based and provided privacy and anonymity, or to a veiled elicitation method that provided even more anonymity since it did not allow inference of any answer to any individual but could be used to accurately estimate statistics about the population. The results showed that the veiled method increased the rates of anti-gay sentiment substantially. Respondents were 67% more likely to express disapproval of an openly gay manager at work and 71% more likely to say it is okay

to discriminate against lesbian, gay, or bisexual individuals. This could explain why attitudes towards homosexuals, as assessed with an explicit questionnaire in this study, showed higher than expected favourable results.

This study's findings could also imply that the nature of awe-inducing stimuli used in this study might not have been potent enough or directly relevant to the domain of effecting changes in sexual prejudicial attitudes. According to Shiota et al. (2007), approximately half of all awe experiences arise in response to awe-inspiring virtuous or magnanimous actions of people of high stature and the next largest category of awe elicitors is nature. Our elicitors of awe were quite mild and included images only in the domain of nature. This raises the questions of whether more intense elicitors of awe (like in-vivo or virtual reality experiences of awe through immersion in nature) or awe elicitors that were more directly related to the domain of prejudice (like speeches of inspiring public figures or virtuous individuals within a community) could be more effective in reduction of sexual prejudice.

The finding that NFC did not have a causal effect on AGP is contrary to Soenen et al. (2005), who found a significant correlation between these two constructs. A point of difference between these studies that could explain the unexpected results for the second hypothesis, is that the present study was done online, while Soenen et al.'s (2005) studies were conducted in-person. According to Krosnick (1991), some respondents take a shortcut to providing answers in a self-report questionnaire engaging in 'satisficing' behaviours like response non-differentiation, random responding, and speeding. These 'satisficing' behaviours are more prominent in online studies because of the ease of responding and lack of a sense of accountability because there is no supervision (Heerwegh & Loosveldt, 2008). It is possible that due to the online mode of conducting this study, the respondents showed higher 'satisficing' behaviours in their responses that led to measurement errors for AGP (Fricker et al., 2005).

Another reason for NFC not showing a main effect on AGP could be related to the individual differences in SDO and RWA levels for the participants. Soenen et al. (2005) found that homophobia had a stronger correlation with RWA than with SDO, and Van Hiel et al. (2004) found a positive effect of NFC on racial prejudice that was fully mediated by RWA but not SDO. A practical implication of Van Hiel et

al.'s (2004) findings is that the interventions aimed at reducing NFC could potentially reduce racial (and other forms of) prejudice by reducing the RWA levels, but would not be successful in reducing SDO levels; therefore, their impact would be substantial in individuals with high RWA but not significant in those with high SDO. While the present study's scope did not include the measurement of RWA and SDO levels in participants, it is possible that more participants with high NFC in this study had high SDO levels (and not high RWA levels), which is probably why NFC did not show the expected effect on AGP.

The finding that there was no interaction effect of awe and NFC on AGP was contrary to Dhont et al. (2011), where they found that NFC moderates the relationship between intergroup contact and racial prejudice. This contradiction could be because inter-group contact and awe work differently as prejudice-reducing interventions - while awe is a self-transcendent positive emotion that works through self-diminishment and humility (Shiota et al., 2007), intergroup contact works through reducing negative emotions of anxiety and fear about outgroups (Pettigrew & Tropp, 2008). Alternatively, it could be because racial prejudice has a higher correlation with NFC than sexual prejudice does with NFC (Soenen et al., 2005).

The results of this study had several implications. First, these results showed that the inducement of awe does not result in sexual prejudicial attitude changes at an explicit level (Dale et al., 2020). Second, these results suggested that factors beyond NFC (like RWA and SDO) may influence the effectiveness of awe-based interventions in reducing prejudice. And lastly, the nonsignificant results raised questions about the conditions under which awe might be effective in reducing sexual prejudice.

Limitations

This study had the following limitations. Firstly, like most research on sexual prejudice (Bartos et al., 2014) this study too used a standardised self-report sexual prejudice scale measuring explicit attitudes towards homosexuals. As discussed above, this could have led to inauthentic reporting of AGP. Dasgupta and Hunsinger (2008) noted that limited resources are the main reasons for performing online research on convenience samples, as was the case with the present study too. The second limitation of this study was employing a convenience sample that heavily skewed the

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demographics in favour of younger female students who, as discussed earlier, are less sexually prejudiced than the general population. Thirdly, this study used an online delivery mode that could have led to measurement errors. Fourthly, this study used a mild elicitor of awe in the domain of nature, not directly related to the domain of prejudice reduction. Lastly, this study did not consider the mediating roles that RWA and SDO could play on the effect of NFC on AGP.

Future research should consider making the following methodological modifications. First, use implicit measures like the IAT used by Banse et al. (2001) or veiled elicitation methods used by Coffman et al. (2016) to achieve a more 'authentic' assessment of AGP. Second, recruit a purposive sample to achieve more representative quotas for age, gender, and occupation to diminish the sampling bias (Bethlehem & Stoop, 2007). Third, conduct the study in an in-person laboratory setting instead of online to minimize measurement errors. Fourth, either use more potent elicitors of awe like an in-vivo or a virtual reality experience of awe in nature, or use awe stimuli like awe-inspiring speeches of virtuous individuals of stature, which would be in the domain of prejudice reduction. Fifth, measure the RWA and SDO levels in participants and assess the meditation effects of RWA and SDO variables on the impact of NFC on AGP.

Conclusion

In conclusion, this experimental study aimed to test if high NFC individuals show higher anti-gay prejudice, if induced awe can reduce anti-gay prejudice, and if it can do so more in prejudice prone (high NFC) individuals. While the results did not support any of the hypotheses, this study's findings contribute to the ongoing debate about whether and under what conditions prejudice can be reduced via induced awe in high NFC individuals. While some studies have shown awe to change prejudicial attitudes at an explicit level, some, including this study, have suggested that it does so only at an implicit level. Some studies have shown that mild awe elicitors like awe-inspiring nature videos are effective in attitude change, while some others including this study, posit that more potent elicitors of awe are required. Some studies have found that high NFC is linked to high levels of sexual prejudice, whereas some others have found that this relationship is more strongly mediated by RWA and not so much by SDO. The potential for this line of research continues

to hold. Future research with suitable methodological changes is recommended. Such suggested changes are: using implicit measures or veiled elicitation methods for authentic measurement of AGP, employing more potent elicitors of awe, assessing the mediating role of RWA and SDO on the effect of induced awe on sexual prejudice reduction, recruiting a purposive sample that is more representative of the general population, and conducting an in-person study instead of an online study to reduce measurement errors.

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Table 1

Anti-Gay Prejudice (AGP) Scores Across Emotion Stimulus and Need for Closure (NFC)

Independent Variable Levels	Mean AGP (SD)	95% CI lower	95% CI upper	Skewness (SE)	Kurtosis (SE)	K-S test sig.	S-W test sig.	N
Awe	94.92 (13.01)	91.34	98.51	-1.34 (.33)	.82 (.64)	.00	.00	53
Amusement	92.82 (15.86)	88.36	97.28	-1.25 (.33)	.34 (.66)	.00	.00	51
Neutral	93.00 (15.28)	88.66	97.34	-1.25 (.34)	.79 (.66)	.00	.00	50
High NFC	93.23 (16.60)	89.47	97.00	-1.16 (.27)	.13 (.54)	.00	.00	77
Low NFC	93.97 (12.57)	91.12	96.83	-1.44 (.27)	1.24 (.54)	.00	.00	77

Table 2

Elicited Awe Scores Across Emotion Stimulus

Emotion type stimulus	Mean Awe level (SD)	95% CI lower	95% CI upper	Skewness (SE)	Kurtosis (SE)	K-S test sig.	S-W test sig.	N
Awe	4.64 (2.14)	4.05	5.23	-.55 (.33)	-1.04 (.64)	.00	.00	53
Amusement	3.08 (1.85)	2.56	3.60	.45 (.33)	-.77 (.66)	.00	.00	51
Neutral	3.52 (2.03)	2.94	4.10	.05 (.34)	-1.38 (.66)	.01	.00	50
Total	3.76 (2.11)	3.42	4.10					154

Examining Coping Skills, Anxiety, and Depression Dynamics Amidst the COVID-19 Pandemic

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This cross-sectional study, conducted amid the COVID-19 pandemic, delves into the intricate connections between coping strategies and levels of anxiety and depression, presenting vital implications for medical, clinical, and broader societal contexts. As crises like the pandemic highlight the importance of adaptive coping, this investigation underscores the imperative to comprehend and address maladaptive coping strategies. The study utilized a diverse sample of 386 participants during the pandemic's peak, employing online platforms for recruitment and ensuring broad demographic representation. Data were collected through self-report measures, including the Patient Health Questionnaire-4 (PHQ-4) for depression and anxiety symptoms and the Brief Coping Orientation to Problems Experienced (COPE) inventory to assess coping skills across various domains. The coping skills assessment measured strategies such as Self-Distraction, Active Coping, Denial, Substance Use, Emotional and Instrumental Support, Behavioral Disengagement, Venting, Positive Reframing, Planning, Humor, Acceptance, Religion, and Self-Blame. The Colorado Multiple Institutional Review Board prioritized and approved ethical considerations, and participants provided informed consent. Data analysis involved rigorous cleaning, recoding, and quantitative analysis using SPSS. Descriptive statistics, regression analyses, and correlation analyses were employed to uncover nuanced relationships between coping strategies and mental health outcomes, contributing to understanding the phenomena under investigation within the context of the pandemic. The findings highlight the pivotal role of individualized approaches and the potential of humor as an essential coping mechanism, emphasizing the need for tailored interventions during crises.

Keywords: pandemic, COVID-19, anxiety, depression, coping skills

Coping skills have gained significant attention for their profound impact on psychological well-being, particularly in the face of heightened stressors such as the ongoing COVID-19 pandemic. This exploration delves into the intricate relationship between coping skills, depression, and anxiety, emphasizing critical studies that contribute to our understanding of these complex dynamics.

The relationship between coping mechanisms and mental health outcomes, specifically depression and anxiety, has been extensively investigated. As the pandemic continues to present unprecedented challenges to global well-being, understanding the dynamics of coping in this context becomes crucial. The Transactional Model of Stress and Coping provides a foundational framework, emphasizing the dynamic nature of the stress-coping process (Etchin et al., 2020). Yeşiloğlu et al. (2023) further classify coping strategies into problem-focused and emotion-focused, shedding light on their distinct impacts on mental health.

Adaptive and maladaptive coping strategies play pivotal roles in elucidating the nuanced relationships between coping mechanisms and mental health outcomes. Features of anxiety and depression may exhibit adaptive characteristics, emphasizing the need for an understanding of coping strategies beyond a binary categorization (Morris, 2019).

Adaptive coping is conceptualized as strategies facilitating effective stress management, enhancing resilience,

and contributing to overall psychological well-being. Examples include seeking emotional and instrumental support, positive reframing, active problem-solving, and employing humor. These adaptive coping mechanisms are considered beneficial in navigating challenges and promoting mental health during times of crisis.

In contrast, maladaptive coping is characterized by strategies that may exacerbate stress, contribute to symptomatology, and hinder psychological resilience, including self-blame, denial, substance use, and behavioral disengagement. Specific coping mechanisms may be context-dependent, exhibiting adaptive or maladaptive qualities based on circumstances and individual differences.

Coping Skills and Anxiety

The interplay between coping skills and anxiety unravels the complexities of adaptive and maladaptive responses to stress, shedding light on the diverse strategies individuals employ to manage anxious thoughts and emotions. Aldwin and Revenson (1987) have significantly contributed to our comprehension of this relationship by establishing a correlation between effective coping strategies and reduced levels of anxiety.

The effectiveness of adaptive coping strategies, particularly those focused on problem-solving, has been consistently demonstrated in alleviating symptoms associated with anxiety (Buffart et al., 2020). Engaging in active problem-solving empowers individuals to confront stressors directly, disrupting the cycle of anxious thoughts and fostering a sense of control over

their circumstances. Conversely, maladaptive coping strategies, such as wishful thinking or avoidance, fuel the perpetuation of anxiety symptoms, emphasizing the importance of distinguishing between adaptive and maladaptive coping approaches (Carver et al., 1989).

Coping Skills and Depression

The relationship between coping skills and depression has been a focal point in psychological literature. Maladaptive coping strategies, such as avoidance and rumination, consistently surface as significant contributors to the exacerbation of depressive symptoms (Al-dao et al., 2010). Southward, Howard, and Cheavens (2023) conducted a comprehensive study highlighting the detrimental effects of maladaptive coping strategies on mental health, particularly with depression.

Avoidance mechanisms may prolong negative emotional experiences. Similarly, rumination, characterized by repetitive and intrusive negative thinking, has been identified as a significant risk factor for the development and perpetuation of depressive symptoms over time (Nolen-Hoeksema, 1991). Addressing these maladaptive coping strategies is crucial for unraveling the complex dynamics underlying depression.

Coping During the COVID-19 Pandemic: A Multifaceted Perspective

Recent studies underscore the relevance of coping skills in navigating the challenges posed by significant life disruptions, such as the ongoing COVID-19 pandemic. Research by Gurvich et al. (2021) and Holmes et al. (2020) emphasizes the importance of effective coping mechanisms in fostering resilience during unprecedented times.

In navigating the mental health implications of the COVID-19 pandemic, individuals have been compelled to employ coping strategies to manage heightened anxiety levels. Research by Ogueji et al. (2021) on coping strategies in the United Kingdom during the pandemic provides valuable insights into the adaptive mechanisms individuals adopt to cope with the stressors unique to this global health crisis. Similarly, the survey by Kar et al. (2021) delves into stress and coping during the pandemic, underscoring the importance of effective coping in mitigating the psychological impact of the crisis.

These studies, situated within the context of a global pandemic, serve as examples of the relevance and urgency of understanding coping skills, particularly in managing anxiety during significant life disruptions.

They underscore the need to understand coping dynamics and the potential adaptation of coping mechanisms in response to unprecedented stressors.

Adaptive Coping as a Protective Factor

In contrast to maladaptive coping, adaptive coping strategies emerge as protective factors in mitigating the impact of stress on mental health, particularly in the context of depression. Problem-solving, a fundamental component of adaptive coping, involves actively addressing stressors and employing constructive solutions to navigate challenges effectively (Compas et al., 2001).

Another adaptive strategy, seeking social support, has been consistently associated with positive mental health outcomes. Compas et al. (2001) highlighted the protective effect of adaptive coping by linking problem-solving and social support-seeking with lower levels of depression.

Nuanced Roles of Coping Mechanisms

The understanding of coping mechanisms and their roles in influencing mental health outcomes sets the stage for an exploration of the interplay between coping and depressive symptoms. Research has not only elucidated the distinct impact of maladaptive and adaptive coping but has also emphasized the need for a holistic approach to intervention.

The complexity of the relationship underscores the importance of tailoring therapeutic strategies to address individual coping profiles and their specific implications for mental health.

Exploring Coping Styles in Response to Societal Changes

Gurvich et al. (2021) delve into the intricate dynamics of coping styles in response to societal changes during the pandemic. This study sheds light on individuals' coping strategies as societal norms change. The significance of this research lies in its contribution to our understanding of coping as a dynamic and adaptive process that individuals engage in when faced with transformative societal challenges.

Diverse Populations and Coping Dynamics

Studies conducted by Savitsky et al. (2020) have taken a comprehensive approach to explore coping during the pandemic across diverse populations. These investigations unravel the intricate interplay between coping strategies, mental health outcomes, and overall quality of life. By examining coping mechanisms across various demographic groups, these studies contribute to understanding how different population segments

navigate stress and adversity during the pandemic.
Healthcare Workers: Coping on the Frontlines

The study conducted by Rose et al. (2021) serves as an investigation into the coping mechanisms employed by healthcare workers, shedding light on the distinctive challenges faced by those on the frontlines of the COVID-19 pandemic. Healthcare professionals, as frontline workers, navigate an array of stressors, including high work demands, exposure to the virus, and witnessing the impact of the pandemic on patients.

Understanding the coping dynamics of healthcare workers is paramount for several reasons. Healthcare professionals are subjected to heightened levels of stress and emotional strain due to the nature of their work, potentially leading to burn-out and mental health challenges (Shanafelt et al., 2020). A study by Lai et al. (2020) highlights the prevalence of anxiety and depression among healthcare workers during the COVID-19 pandemic, underscoring the need for effective coping strategies.

Moreover, the well-being of healthcare workers has broader implications for public health. An overburdened and stressed healthcare workforce is more susceptible to making errors, experiencing reduced job satisfaction, and facing challenges in delivering high-quality patient care (West et al., 2018). Therefore, the psychological health of healthcare workers is essential to maintaining a resilient and effective healthcare system.

In the context of the COVID-19 pandemic, understanding and addressing the mental health of healthcare workers has also become crucial for the broader community. The psychosocial well-being of healthcare professionals influences their ability to effectively manage the challenges posed by the pandemic, contributing to the overall resilience of the healthcare system (Kisely et al., 2020). As highlighted by Greenberg et al. (2020), the mental health of frontline workers is critical in ensuring a sustained and robust response to public health crises.

Contributions to the Evolving Narrative

These studies contribute to the evolving narrative on coping during the COVID-19 pandemic. These investigations provide an examination of coping from various angles, considering different populations and contexts, and emphasizing the dynamic nature of coping strategies. The current investigation strategically adopts a cross-sectional design to align with this complex landscape, capturing

a timely snapshot of how coping strategies relate to anxiety and depression during the ongoing pandemic.

Hypotheses

1. Self-Distraction Hypothesis: Individuals who employ self-distraction as a coping mechanism (redirecting attention to activities) will exhibit lower levels of anxiety and depression compared to those who do not engage in this coping strategy.

2. Active Coping Hypothesis: Participants who proactively address stressors through active coping strategies will demonstrate lower anxiety and depression levels than individuals who lack operational coping tendencies.

3. Denial Hypothesis: Individuals who frequently resort to denial as a coping strategy (avoiding or refusing to acknowledge stressors) will display higher levels of anxiety and depression compared to those who employ alternative coping mechanisms.

4. Substance Use Hypothesis: Participants who turn to substances as a coping mechanism will exhibit elevated levels of anxiety and depression compared to those who utilize alternative coping strategies.

5. Emotional Support Hypothesis: Individuals who seek emotional support (seeking empathy and understanding from others) will demonstrate lower anxiety and depression levels compared to those who do not actively pursue emotional support.

6. Instrumental Support Hypothesis: Participants who seek tangible assistance or advice (use instrumental support) as a coping strategy will exhibit lower levels of anxiety and depression compared to those who do not engage in this coping mechanism.

7. Behavioral Disengagement Hypothesis: Individuals who frequently withdraw from stressors through behavioral disengagement will display higher levels of anxiety and depression compared to those who employ alternative coping strategies.

8. Venting Hypothesis: Participants who express negative emotions through venting as a coping strategy will demonstrate lower levels of anxiety and depression compared to individuals who do not engage in this coping mechanism.

9. Positive Reframing Hypothesis: Individuals who reinterpret stressors in a positive light through positive reframing will exhibit lower levels of anxiety and depression compared to those who do not employ this coping strategy.

10. Planning Hypothesis: Participants who engage

in planning and strategizing to overcome stressors will demonstrate lower anxiety and depression levels compared to those who lack effective planning as a coping mechanism.

11. Humor Hypothesis: Individuals who find humor in challenging situations will exhibit lower levels of anxiety and depression compared to those who do not use humor as a coping strategy.

12. Acceptance Hypothesis: Participants who acknowledge and accept stressors (acceptance as a coping strategy) will demonstrate lower levels of anxiety and depression compared to those who struggle with accepting stressors.

13. Religion Hypothesis: Individuals who turn to religious or spiritual beliefs as a coping mechanism will exhibit lower levels of anxiety and depression compared to those who do not engage in religious coping strategies.

14. Self-Blame Hypothesis: Participants who take responsibility for stressors through self-blame will display higher levels of anxiety and depression compared to those who employ alternative coping mechanisms.

Methods

Study Design

A cross-sectional design was employed to investigate the relationships among coping skills, anxiety, and depression. The selection of a cross-sectional approach allowed the researcher to examine these variables simultaneously, providing a snapshot of their associations within a specific timeframe.

The adoption of a cross-sectional design conferred several distinct advantages to this investigation. It facilitated a thorough exploration of the dynamic interplay between coping skills, anxiety, and depression without necessitating a protracted observational period. This data collection and analysis efficiency is particularly noteworthy, enabling the researcher to understand the relationships among these variables within a relatively condensed timeframe.

The cross-sectional design further empowered the researcher to discern patterns and associations in real-time, capturing a momentary cross-section of participants' experiences and mental health dynamics. By leveraging the advantages of the cross-sectional approach, the study not only efficiently investigated the interconnections among coping skills, anxiety, and depression but also provided a timely and relevant depiction of these associations. This

design choice reflects a pragmatic and effective methodological strategy, enhancing the study's capacity to contribute meaningful insights to the existing body of knowledge in mental health research.

Participants

These data were collected during the Summer and Fall of 2020, the pinnacle of the COVID-19 pandemic. A total of 386 participants contributed to this study by completing assessments related to coping skills, anxiety, and depression. The diverse participants ensured a broad representation of demographics and experiences (See Table 1).

Recruitment

The study employed a recruitment strategy leveraging various online platforms such as Canvas, Facebook, Twitter, Instagram, and Reddit. The recruitment aimed to assemble a sample (N = 386) that met specific eligibility criteria, including being over 18 years old and proficient in English.

Measures and Coping Skills Assessment

As part of the self-report measures, participants engaged with the Patient Health Questionnaire-4 (PHQ-4), a succinct four-item tool designed to assess symptoms of depression and anxiety over the preceding two weeks. The PHQ-4 utilized a scoring system to categorize responses, where a total score greater than or equal to three for the first two questions indicated anxiety and the same threshold for the last two questions suggested depression. Scores were further stratified into normal (0-2), mild (3-5), moderate (6-8), and severe (9-12) categories, offering an understanding of participants' mental health status.

Additionally, participants completed a coping skills inventory, a robust instrument known as the Brief Coping Orientation to Problems Experienced inventory. This tool measured coping skills across various domains without employing reversals of coding. The following coping skills were assessed, each associated with specific items that were summed:

1. Self-Distraction (Items 1 and 19): Redirecting attention to activities to cope with stress.
2. Active Coping (Items 2 and 7): Proactively address stressors.
3. Denial (Items 3 and 8): Avoiding or refusing to acknowledge stressors.
4. Substance Use (Items 4 and 11): Turning to substances as a coping mechanism.
5. Use of Emotional Support (Items 5 and 15):

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- Seeking empathy and understanding from others.
6. Use instrumental support (Items 10 and 23): Seeking tangible assistance or advice.
 7. Behavioral Disengagement (Items 6 and 16): Withdrawing from stressors.
 8. Venting (Items 9 and 21): Expressing negative emotions.
 9. Positive Reframing (Items 12 and 17): Reinterpreting stressors in a positive light.
 10. Planning (Items 14 and 25): Strategizing to overcome stressors.
 11. Humor (Items 18 and 28): Finding Humor in challenging situations.
 12. Acceptance (Items 20 and 24): Acknowledging and accepting stressors.
 13. Religion (Items 22 and 27): Turning to religious or spiritual beliefs.
 14. Self-Blame (Items 13 and 26): Taking responsibility for stressors.

These coping skills, each measured by specific items, contributed to an understanding of participants' strategies for dealing with stress and adversity—the assessment aimed to uncover how individuals approach and navigate life challenges.

Procedures

Ethical considerations were paramount in conducting this research, and the study received approval from the Colorado Multiple Institutional Review Board (COMIRB). Participants provided informed consent before completing online surveys, a process overseen by the COMIRB (identification number 20-2870). The survey took approximately 30 minutes, thoroughly exploring participants' coping mechanisms and mental health.

Data Analysis

Quantitative data, exported from Qualtrics to SPSS v27, underwent a systematic analysis. Initial recording aligned responses with predefined scales, facilitating categorization and interpretation—rigorous cleaning and recoding followed to enhance data reliability and validity. Descriptive statistics provided an overview, including mean and standard deviations. Regression analyses explored variable relationships, identifying potential predictors. Correlation analyses delved into associations, unveiling patterns and interdependencies within the dataset. This analytical approach aimed to extract insights from the collected data, contributing to a robust understanding of the investigated phenomena.

Results

The descriptive statistics and correlations for anxiety, depression, and various study variables were examined in a sample of 386 participants (see Table 2). The mean anxiety score was 4.83 ($SD = 2.04$), which is within the range of mild anxiety, and the mean depression score was 4.72 ($SD = 2.06$), which is within the range of mild depression. Among the coping strategies assessed, Self-Distraction exhibited a positive correlation with anxiety ($r = 0.23, p < .01$) and a positive, albeit less substantial, correlation with depression ($r = 0.15, p < .05$). Active Coping, on the other hand, showed a negative correlation with both anxiety ($r = -0.16, p < .05$) and depression ($r = -0.29, p < .01$).

The Use of Emotional Support was negatively correlated with both anxiety ($r = -0.18, p < .01$) and depression ($r = -0.34, p < .01$), indicating that higher utilization of emotional support was associated with lower levels of anxiety and depression. Similar patterns were observed for the Use of Instrumental Support, with a negative correlation with depression ($r = -0.28, p < .01$). Behavioral Disengagement demonstrated positive correlations with anxiety ($r = 0.22, p < .01$) and depression ($r = 0.36, p < .01$). Positive Reframing demonstrates a negative association with depression ($r = -0.18, p < .01$), suggesting that individuals employing positive reframing may experience lower depression levels. Planning demonstrates a positive association with anxiety ($r = 0.27, p < .01$) and depression ($r = 0.23, p < .01$), suggesting that individuals employing planning may experience higher anxiety and depression levels. Notably, Humor was strongly negatively correlated with both anxiety ($r = -0.43, p < .01$) and depression ($r = -0.43, p < .01$). Religion showed a negative correlation with depression ($r = -0.18, p < .01$), but no significant correlation with anxiety. Self-Blame displayed positive correlations with both anxiety ($r = 0.34, p < .01$) and depression ($r = 0.29, p < .01$). The anxiety and depression scores were highly correlated ($r = 0.65, p < .01$), emphasizing a strong association between anxiety and depression within the sample.

The regression analysis for anxiety (see Table 3) reveals several coping styles with significant associations. Notably, engaging in Humor ($B = -0.51, \beta = -0.29, t = -4.42, p < .001$) is strongly linked to lower anxiety levels. Additionally, Self-Blame ($B = 0.35, \beta = 0.27, t = 3.36, p < .001$) exhibits a positive associ-

ation with anxiety, indicating that individuals employing Self-Blame as a coping mechanism are more likely to experience heightened anxiety. These relationships are robust, as reflected in the wide 95% confidence intervals (CI) for both Humor ($LL = 0.28$, $UL = 0.74$) and Self-Blame ($LL = 0.14$, $UL = 0.55$), further supporting the reliability of these findings.

The regression analysis for depression (see Table 4) also highlights significant coping styles. Behavioral Disengagement ($B = 0.30$, $\beta = 0.253$, $t = 4.43$, $p < .001$) is positively associated with depression, suggesting that individuals utilizing this coping mechanism may experience elevated depressive symptoms. In contrast, Humor ($B = -0.44$, $\beta = -0.23$, $t = -4.10$, $p < .001$) is negatively associated with depression, suggesting that individuals utilizing these coping mechanisms may experience lower depressive symptoms. The Use of Emotional Support ($B = -0.19$, $\beta = -0.19$, $t = -2.68$, $p = 0.008$) and Religion ($B = -0.20$, $\beta = -0.15$, $t = -2.35$, $p = 0.02$) demonstrate negative associations with depression, indicating that these coping styles are linked to lower depressive symptoms. Conversely, Acceptance ($B = 0.23$, $\beta = 0.17$, $t = 2.53$, $p = 0.01$) is positively associated with depression, suggesting that individuals utilizing this coping mechanism may experience elevated depressive symptoms. The 95% CI for these significant relationships further strengthens their validity.

Several coping styles did not exhibit statistically significant associations with anxiety and depression. These include Self-Distraction, Active Coping, Denial, Substance Use, Use of Emotional Support, Use of Instrumental Support, Venting, Positive reframing, Planning, Acceptance, and Religion in the context of anxiety, as well as Self-Distraction, Active Coping, Denial, Substance Use, Use of Instrumental Support, Venting, Positive reframing, and Planning in the context of depression. The lack of statistical significance suggests that these coping styles may not be directly linked to anxiety or depression in the studied population, underscoring the diversity of coping mechanisms individuals employ, and emphasizing the need for personalized approaches in clinical interventions.

The consideration of unstandardized coefficients (B), standardized coefficients (β), t -values, p -values, and 95% confidence intervals enhances the robustness and interpretability of these findings in the context of mental health outcomes. This analysis provides an understanding of how specific coping

styles relate to anxiety and depression, shedding light on both significant and non-significant associations.

Discussion

The multiple linear regression analyses yield crucial insights into the intricate relationships between coping styles and anxiety and depression. Contextualizing these findings within the broader framework of significant life disruptions, such as those experienced during the COVID-19 pandemic and other catastrophic events, is essential. Regarding coping styles and anxiety, Humor exhibits a negative association with anxiety levels, aligning with contemporary literature emphasizing its effectiveness as a stress-coping strategy (Marziali et al., 2008). It emerges as a protective factor against depression, supporting its mood-enhancing and stress-reducing effects, particularly relevant during major life disruptions (Chen & Lim, 2022).

The positive association observed between Self-Blame and anxiety underscores the maladaptive nature of this coping style, particularly during crises (Maulder et al., 2010). The inclination toward Self-Blame may exacerbate anxiety symptoms, emphasizing the importance of identifying and redirecting such maladaptive coping. Additionally, the link between Behavioral Disengagement and higher depression levels reinforces the need to address maladaptive coping that could lead to heightened depression (Bonanno, 2004).

The findings also highlight the potential vulnerability of disengaging from Active Coping strategies when facing adversity. The significant negative associations of the Use of Emotional Support and Acceptance with depression underscore the pivotal role of social support and adaptive Acceptance in promoting mental well-being, aligning with studies emphasizing the importance of interpersonal connections during crises (Rosen et al., 2022). Behaviors that accentuate Emotional and Instrumental Support, Humor, and Acceptance align with identified protective factors against depression and anxiety.

Recognizing the diverse nature of individual coping mechanisms is essential (Stanley et al., 2021). The unique nature of crises emphasizes the need for targeted interventions that address maladaptive coping strategies, such as Self-Blame, pervasive in the aftermath of catastrophic events. It is crucial to recognize ineffective coping mechanisms and redirect them towards more constructive approaches. This aligns with

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established best practices outlined by the National Academies of Sciences, Engineering, and Medicine (2019), emphasizing the importance of psychoeducation to enhance emotional and instrumental support.

The literature on coping during catastrophic events underscores the need for a multifaceted approach. Studies highlight the importance of community-level coping strategies in the aftermath of large-scale disasters, emphasizing the interconnectedness of individual coping with broader societal responses (Bonanno et al., 2010). The collective efficacy of communities in navigating and recovering from catastrophic events is an essential aspect that complements individual coping strategies (Kocalevent et al., 2015). Their research suggests that resilience is not a uniform trait, and individuals may employ various coping mechanisms based on their unique characteristics and circumstances (Bonanno & Diminich, 2013).

The implications of effective coping mechanisms in the context of catastrophic events extend beyond individual well-being to encompass broader societal resilience (Norris et al., 2008). The ongoing COVID-19 pandemic serves as a backdrop to these insights, emphasizing the need for adaptive coping strategies at the community level. As we navigate the aftermath of such events, an approach that addresses maladaptive coping enhances support systems, contributing to a more resilient and mentally healthy society.

Non-professionals can also independently implement effective coping strategies. These strategies can promote an individual's resilience and well-being by fostering supportive social networks and seeking tangible assistance when needed. In the broader context of community and societal well-being, awareness campaigns and educational initiatives become crucial. By disseminating information about effective coping strategies, the public can learn to create a more supportive and resilient society. This can enable individuals to cope better with challenging situations (Holmes et al., 2020; World Health Organization, 2020).

Future Directions

It is imperative to broaden our investigation into sleep patterns and their potential interplay with mental health challenges, specifically anxiety and depression. Sleep, acknowledged as a pivotal factor in mental well-being, represents a relatively uncharted terrain within the context of coping skills. Probing into how coping skills might influence sleep quality and, reciprocally,

how disrupted sleep patterns might impact mental health outcomes holds the promise of unveiling novel dimensions in our understanding of these phenomena.

Recognizing the bidirectional relationship between coping skills and sleep could furnish insights into the holistic well-being of individuals contending with anxiety and depression. Sleep disturbances have been correlated with a spectrum of mental health challenges, and exploring this link within the framework of coping skills may furnish valuable information for developing integrated interventions (Zhao et al., 2022).

To propel our understanding further, future research endeavors may employ methodologies such as longitudinal studies or ecological momentary assessments, to capture real-time fluctuations in coping skills and sleep patterns. Additionally, investigating potential mediating or moderating factors, such as stress or anxiety, could contribute to a more comprehensive understanding of the intricate connections between coping skills, anxiety, depression, and sleep.

This study not only advances our understanding of coping skills and their associations with anxiety and depression but also lays the groundwork for future research initiatives, therapeutic approaches, and support mechanisms tailored to the unique needs of individuals grappling with these complex mental health challenges.

Limitations

This study is subject to certain limitations that should be considered when interpreting the results. One notable limitation is the overrepresentation of women in the clinically significant range for depression and anxiety. Additionally, the study's focus on a sample of notably younger and technologically adept participants raises the possibility that the results may apply primarily to specific demographic subsets rather than the entire population.

Moreover, the study was conducted amid the COVID-19 pandemic, a period associated with a heightened prevalence of depression and anxiety. This temporal context could impact the results, potentially leading to an overestimation of mental health issues. Researchers conducting similar studies with larger samples experiencing depression and anxiety should be cautious about generalizing findings to populations unaffected by pandemic-related stressors. Therefore, recognizing the influence of the pandemic on mental health trends is crucial for a nuanced interpretation of study outcomes.

Conclusion

Understanding coping strategies and their profound implications for depression extends beyond clinical settings. Recognizing individual coping patterns and tailoring interventions accordingly empowers both clinicians and individuals to contribute actively to advancing mental health and alleviating depression. This approach addresses the immediate needs of individuals and fosters a cultural shift towards a more empathetic and informed approach to mental health and well-being.

Comprehending coping strategies becomes even more crucial amid significant life disruptions, such as the ongoing COVID-19 pandemic, emphasizing the need for effective coping mechanisms on a societal scale. The insights gained from understanding coping strategies during such turbulent times aid in immediate crisis management and contribute to the resilience and adaptability of individuals facing adversity.

This study unveils the myriad coping strategies individuals adopt to navigate the complexities of mental health challenges. The insights gleaned offer a nuanced perspective on how coping skills may relate to emotional experiences and well-being during heightened stress and uncertainty.

Exploring coping strategies within the context of life-altering events is crucial for tailoring interventions to the unique needs of individuals experiencing mental health challenges. This research provides a timely contribution to our understanding of coping dynamics amid significant societal upheavals, facilitating the development of targeted strategies to support mental well-being during times of crisis.

Comprehending coping strategies extends beyond individual well-being to societal resilience, especially during the unparalleled challenges posed by events like the COVID-19 pandemic. Tailoring interventions to the distinctive needs of individuals grappling with mental health challenges during such disruptive events is integral to fostering a more adaptive society.

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MOMENT

Table 1

Table of Demographic Data

Country	Total	Female	Male	Minimum Age	Maximum Age
United States	242	163	79	18	51
Canada	71	52	19	18	45
Mexico	29	29	0	20	31
South Africa	11	8	4	18	27
Egypt	10	5	5	25	48
Russia	10	9	2	18	19
Turkey	5	5	0	19	53
United Kingdom	4	3	1	18	37
Ukraine	4	2	0	28	45

Note. Nationality, age, and sex of participants.

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Table 2

Descriptive Statistics and Correlations for Anxiety, Depression, and Study Variables

Coping Style	n	M	SD	Anxiety	Depression
Self-Distraction	386	4.90	1.65	.23**	.15*
Active Coping	386	4.82	1.71	-.16*	-.29**
Denial	386	3.58	1.75	.05	.05
Substance Use	386	3.72	2.18	.04	.02
Use of Emotional Support	386	4.64	2.06	-.18**	-.34**
Use of Instrumental Support	386	4.97	1.52	-.11	-.28
Behavioral Disengagement	386	4.56	1.73	.22**	.36**
Venting	386	4.05	1.70	.08	.06
Positive reframing	386	4.95	1.88	-.06	-.17**
Planning	386	5.27	1.65	.27**	.23**
Humor	386	2.95	1.12	-.43**	-.43**
Acceptance	386	4.86	1.55	.12	0.06
Religion	386	4.46	1.52	-.05	-.18**
Self-Blame	386	4.89	1.56	.34**	.29**
Anxiety	386	4.83	2.04	1	.65**
Depression	386	4.72	2.06	.65**	1

Note. The table includes descriptive statistics and correlations for anxiety, depression, and study variables. The table includes mean (M), standard deviation (SD), and correlations with anxiety and depression scores.

* $p < .05$, ** $p < .01$.

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Table 3

Regression for Anxiety and Coping Styles

Coping Style	B	β	t	p	95% CI	
					LL	UL
Self-Distraction	0.07	0.05	0.86	0.39	-0.09	0.22
Active Coping	-0.09	-0.08	-1.12	0.26	-0.27	0.07
Denial	-0.04	-0.04	-0.57	0.57	-0.19	0.11
Substance Use	-0.06	-0.07	-1.08	0.28	-0.18	0.05
Use of Emotional Support	-0.10	-0.10	-1.28	0.20	-0.25	0.05
Use of Instrumental Support	0.08	0.06	0.76	0.45	-0.13	0.29
Behavioral Disengagement	0.10	0.09	1.36	0.18	-0.05	0.24
Venting	-0.15	-0.13	-1.80	0.07	-0.32	0.01
Positive reframing	-0.034	-0.04	-0.54	0.59	-0.18	0.11
Planning	0.11	0.09	1.16	0.25	-0.08	0.30
Humor	-0.51	-0.28	-4.42	<.001**	-0.28	0.74
Acceptance	0.13	0.10	1.36	0.18	-0.06	0.33
Religion	-0.13	-0.09	-1.43	0.16	-0.31	0.05
Self-Blame	0.35	0.27	3.36	<.001**	0.14	0.55

Note. The table presents unstandardized coefficients (B), standardized coefficients (β), Lower Limit (LL), Upper Limit (UL), *t*-values, *p*-values, and 95% confidence intervals for each predictor variable in relation to the dependent variable total anxiety.

p* < .05, *p* < .01.

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Table 4

Regression for Depression and Coping Styles

Coping Style	B	β	t	p	95% CI	
					LL	UL
Self-Distraction	0.03	0.02	0.36	0.72	-0.12	0.17
Active Coping	-0.11	-0.09	-1.34	0.18	-0.26	0.05
Denial	-0.08	-0.06	-1.06	0.29	-0.21	0.06
Substance Use	-0.06	-0.06	-1.16	0.25	-0.17	0.04
Use of Emotional Support	-0.19	-0.19	-2.68	0.008*	-0.34	-0.05
Use of Instrumental Support	-0.07	-0.05	-0.67	0.51	-0.26	0.13
Behavioral Disengagement	0.30	0.25	4.43	<.001**	0.17	0.43
Venting	-0.08	-0.06	-0.99	0.33	-0.23	0.08
Positive reframing	-0.08	-0.07	-1.18	0.24	-0.21	0.05
Planning	0.09	0.07	0.97	0.33	-0.09	0.26
Humor	-0.44	-0.24	-4.10	<.001**	-0.23	0.65
Acceptance	0.23	0.17	2.53	0.012*	0.05	0.41
Religion	-0.20	-0.15	-2.35	0.019*	-0.37	-0.03
Self-Blame	0.27	0.21	2.87	0.004*	0.09	0.46

Note. The table presents unstandardized coefficients (B), standardized coefficients (β), Lower Limit (LL), Upper Limit (UL), *t*-values, *p*-values, and 95% confidence intervals for each predictor variable in relation to the dependent variable total depression.

p* < .05, *p* < .01.

Decoding Factors Influencing Mental Health Help-Seeking in Asian International Students: A Correlational Survey Study

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This study investigates the effects of gender, age, perceived socioeconomic status, and attitudes toward mental health treatment, alongside the awareness and accessibility of mental health services, on the propensity of Asian international undergraduate and graduate students in U.S. colleges to seek mental health support. Utilizing an online survey, responses from a diverse group of 116 participants, aged 18 and above, from universities across the nation were examined through correlation analysis. Findings indicated no significant gender differences in attitudes toward mental health treatment. However, factors such as higher educational level, superior socioeconomic background, longer U.S. residency, and increased awareness and accessibility of mental health services positively influenced attitudes. This quantitative study extends previous qualitative research addressing similar questions, filling a gap by offering broader empirical insights into this population's mental health service utilization. The outcome underscores the need for university counseling centers to develop targeted interventions that acknowledge the needs of Asian international students. Future research should explore the longitudinal impacts of these factors on mental health help-seeking behaviors to inform ongoing service improvement.

Keywords: mental health treatment, attitudes toward mental health, Asian international students, awareness and accessibility, socioeconomic influences

Mental disorders have a significant impact on a substantial portion of the global population. Warren (2023) noted that approximately 50 million individuals in the U.S. are affected by a diagnosable mental disorder. In March 2022, the World Health Organization reported a 25% increase in anxiety and depression diagnoses worldwide, alongside an increased risk of suicidal ideation (Kola, 2022). Notably, college students represent a demographic with a higher incidence of mental health issues. A comprehensive study by Auerbach et al. (2018) revealed that out of 13,984 American college students surveyed, 35% tested positive for at least one of six mental health disorders. The study further indicated a prevalence rate of 31.4% for mental health disorders within the past year and a lifetime prevalence of 35.3% (Auerbach et al., 2018). More recent data underscores this concern. The American College Health Association's (ACHA) 2022 National College Health Assessment, which surveyed over 54,000 undergraduate students, found that approximately 77% were experiencing moderate to serious psychological distress.

While the mental health of college students is a broad concern, international students represent a particularly vulnerable group. Shadowen (2019) discovered that international students often report high levels of depression and anxiety. In his study of 490 individuals, 45.3% met the criteria for clinically significant depression on the Center for Epidemiologic Studies Depression Scale (CES-D), and 24.7%

showed moderate to severe anxiety symptoms as per the Beck Anxiety Inventory (BAI). Further emphasizing this issue, Jamshaid (2023) conducted a longitudinal study revealing that international students experienced increased levels of depression and anxiety during and following the COVID-19 pandemic.

Despite the high prevalence of mental disorders, the rate at which individuals seek treatment remains concerningly low. Khoury and Ammar (2014) found that only 23% of individuals with mental illnesses in the United States sought treatment. Data from the National Health Interview Survey (NHIS) in 2019 indicated that just 19.2% of adults aged 18 and over had received any mental health treatment in the previous 12 months, a figure that increased slightly to 21.6% by 2021 (Terlizzi, 2022). Although Warren (2023) reported a rise in treatment prevalence to 45% in 2023, the situation appears different within the college student population. According to the American College Health Association-National College Health Assessment (ACHA-NCHA), only 24% of students diagnosed with depression sought treatment, and this percentage was even lower among international students. Mesidor (2014) found that a mere 17.7% of international students ($n=34$) with mental health concerns intended to seek help. Further, a study by Zhou et al. (2021) highlighted a significant disparity in service utilization between international and domestic students ($n=96,567$), with respective rates

of 32.0% and 49.8%. This low prevalence of treatment-seeking behavior in both the broader college population and particularly among international students remains a major concern for many universities.

Given the gap between the need for mental health services and the actual rates at which individuals, especially international students, seek out these services, one cannot help but wonder what specific challenges are faced by this population that further complicate this scenario. Are cultural perceptions, stigma, or perhaps the lack of culturally sensitive resources exacerbating their reluctance to seek help? Imagine the internal struggle of a student, thousands of miles away from home, facing not only the usual stresses of academic life but also navigating a foreign mental health system that feels alien to them. As we delve into the specific mental health issues faced by this group, we must consider these unique barriers, and explore how universities can bridge the gap between the need for and utilization of mental health services among international students.

The Mental Health Landscape of International Students

Many existing studies have identified international students as particularly vulnerable to mental health challenges, arising from a combination of factors including academic pressures, language barriers, cultural adjustment, financial stress, and a reluctance to seek help (Dombou et al., 2023; Friday, 2018; Jiang et al., 2020; Mohammadifrouzeh et al., 2023). These students face not only intense academic competition but also overwhelming stress and anxiety (Asif et al., 2020). Furthermore, adapting to new food, climate, and societal systems can significantly exacerbate these stressors, potentially leading to conditions such as depression (Cianconi et al., 2020). Prieto-Welch (2016) encapsulates this by noting that “international students face unique pressures and struggles which may interact with and amplify the expected stressors,” leading to grave outcomes such as academic difficulties, addiction, suicidal ideation, and broader health concerns.

Among these myriad challenges, language barriers emerge as a particularly pivotal issue, exacerbating feelings of isolation and communication difficulties (Smith & Khawaja, 2011; Wilczewski & Alon, 2023). This sense of isolation extends beyond social aspects, potentially impairing international students’ academic performance as they may struggle to comprehend lectures, participate in discussions, or seek assistance

from peers and instructors. Smith and Khawaja (2011) underscore how these language barriers intensify the stress associated with adjusting to a new academic environment. However, the journey of adaptation for international students does not end with overcoming language obstacles. The impact of cultural adjustment on the mental health of international students is also significant (Razgulin et al., 2023). Mori (2000) posits that adapting to an unfamiliar cultural environment is a multifaceted and challenging process, often resulting in “culture shock.” This can manifest as anxiety, confusion, and depression, as students attempt to reconcile their cultural norms with those of the host country. International students commonly experience homesickness, and longing for family, friends, and familiar environments (Mekonen & Adarkwah, 2023; Sawir et al., 2008). This sense of loss can amplify feelings of loneliness and alienation, further exacerbating mental health concerns.

Beyond cultural and social challenges, financial pressures constitute another critical factor impacting the mental health of international students. They typically incur higher tuition fees and living expenses, along with limited work opportunities due to visa constraints (Lee & Rice, 2007; Olatunji et al., 2023). Such financial burdens can induce considerable stress and anxiety, as students grapple with fulfilling both their expenses and familial expectations. Compounding these issues is the stigma associated with mental health challenges and a lack of familiarity with the host country’s mental health services, which often leads to reluctance to seek help (Guo et al., 2019; Poyrazli & Lopez, 2007). Without timely and appropriate intervention, these compounded stresses can exacerbate existing mental health conditions, underscoring the urgent need for accessible and culturally sensitive support systems for international students.

The majority of international students are vulnerable to the repercussions previously mentioned, making these issues a primary concern for many higher educational institutions. Despite this, the inclination to seek professional mental health assistance remains notably low among international students, particularly those from Asian backgrounds. Nilsson et al. (2004) found a significantly lower prevalence of mental health treatment among international students at university counseling centers compared to their domestic U.S. counterparts. Wong et al. (2013) highlighted that,

due to acculturation challenges, Asian international students have the lowest rate of mental health treatment among all international student groups. Empirical research further reveals the susceptibility of Asian international students to mental health issues. Sun et al. (2020) reported that perceived discrimination and cultural adjustment difficulties significantly contribute to increased psychological distress in Chinese international students. Additionally, Yu et al. (2023) identified language barriers and social isolation as major stressors, often resulting in anxiety and depression. These findings gain added significance considering the large population of Asian international students at U.S. universities, underscoring the urgent need for targeted mental health support. Korhonen (2023) reported that the majority of international students in the U.S. are from China (289,526), India (268,923), and South Korea (43,847), making Asians the most populous regional group. As such, Korhonen (2023) underscored the critical need to understand and address the unique mental health challenges of this significant portion of the international student body.

Neglect of Mental Health Importance in Asian Cultures

Many Asian international students face significant mental health challenges upon their arrival in the United States for study, largely due to cultural perceptions of mental health in their home countries (Alegria, 2017). In these cultures, mental health issues are often overlooked, and seeking professional help is perceived as a weakness (Martinez, 2020). This cultural backdrop may lead to a lack of essential understanding among these students about mental health, available treatment options, and resources in their new environment, potentially discouraging them from seeking help or limiting their opportunities to gain mental health education (Jang, 2007).

The reluctance to address mental health concerns is deeply embedded in the traditional values and societal norms of many Asian cultures, where stoicism and self-reliance are highly valued (Chen & Jiang, 2022). Mental health issues are frequently viewed as personal failings rather than medical conditions that require attention, thus perpetuating stigma and discouragement from seeking help (Yin et al., 2020). This viewpoint is further supported by Zhang et al. (2019), who reported that in many Asian societies, mental health problems are often not recognized as

legitimate health issues. Instead, they are seen as a source of embarrassment or stigma. Yang et al. (2019) expand on this, noting that mental health issues are frequently interpreted as a disruption of social harmony or a sign of weakness. Moreover, studies by Martinez et al. (2020) reveal that in some Asian cultures, there is a strong emphasis on family reputation and honor, which often takes precedence over individual well-being. As a result, mental health concerns are often hidden to avoid bringing “shame” to the family.

In their qualitative study, Chen and Vivekananda (2021) found that this leads to a significant underreporting of mental health issues among Asian populations. In many Asian cultures, mental health issues are heavily stigmatized and often concealed due to societal perceptions that categorize them as personal failures, sources of shame, or burdens to the family (Misra et al., 2021). Societal pressures and gender expectations can exacerbate these concerns, making it particularly challenging for individuals to voice their struggles with mental health. For instance, societal norms often impose additional obstacles on women, as they are frequently expected to prioritize their family's and community's needs over their mental well-being (Kundadak et al., 2020).

The disparity in mental health awareness between Asian communities and Western societies, as noted by Tse and Haslam (2021), further complicates the situation. Many individuals from Asian backgrounds may not recognize symptoms of mental health disorders or know how to seek appropriate help. This lack of awareness, alongside a preference for traditional healing practices and community support over formal mental health care, can limit access to and utilization of necessary mental health services (Pham et al., 2021). While these traditional methods can be beneficial, they may not always be sufficient for treating complex mental health disorders. Yakunina and Weigold (2011) explored the interplay between cognitive variables and cultural factors influencing Asian international students' intentions to seek counseling. Their findings indicated that participants who endorsed more traditional Asian values reported less favorable attitudes toward counseling and lower intentions to seek help. This result highlights the significant impact of cultural values on mental health help-seeking behavior among Asian international students.

In summary, the neglect of mental health impor-

tance in Asian cultures is a complex issue, influenced by traditional values, societal norms, family dynamics, and a lack of mental health awareness. This further complicated as Asian international students navigate the acculturation process in their host countries, where the clash between these deeply ingrained cultural norms and the new societal context can create significant barriers to seeking mental health support.

Acculturation Issues Preventing Help-Seeking

Acculturation issues pose significant barriers for Asian international students seeking mental health support in the United States. Ma et al. (2020) identified that the adjustment to social and cultural norms of the host country often exacerbates existing mental health conditions and deters help-seeking due to fears of misunderstanding or judgment. This situation is compounded by cultural dissonance, where conflicts between students' native cultural beliefs and those of the host country led to increased stress and anxiety, a phenomenon Martinez-Taboada (2018) found to be prevalent among these students. The challenge of navigating between maintaining one's cultural identity and conforming to a new environment adds another layer of complexity to their experiences.

Furthermore, language barriers, as Lasauskiene and Bagdonaviciute (2023) point out, play a critical role in intensifying feelings of isolation and helplessness, particularly among students with limited English proficiency. This difficulty in communicating emotional and psychological needs effectively is a significant hurdle. Suh et al. (2023) add to this narrative by emphasizing the impact of perceived discrimination and stereotyping on these students' mental health. Such experiences can foster a sense of alienation and reluctance to seek help, for fear of further marginalization or stigmatization.

Navigating the U.S. mental health care system presents its own set of challenges, as highlighted by Clough et al. (2018). Asian international students may be unfamiliar with how mental health services operate in the U.S. and lack knowledge about available resources, significantly deterring help-seeking. Ra (2023) discussed the importance of social support networks in the acculturation process, noting that a lack of supportive relationships in the host country can lead to increased vulnerability and a decreased likelihood of seeking mental health services. The accumulation of these factors illustrates the complex interplay between

acculturation stress, systemic barriers, and individual challenges in hindering the mental health help-seeking process among Asian international students.

The findings of Miller et al. (2011) enrich our understanding of the intricate dynamics between acculturation, enculturation, and their effects on mental health and attitudes toward seeking professional psychological help among Asian international students. Their study revealed that higher levels of acculturation were linked to improved mental health outcomes, while a strong sense of behavioral enculturation was positively correlated with mental health.

This research unearthed significant differences in the experiences of foreign-born and U.S.-born students, particularly concerning the impact of acculturative stress on mental health. Such distinct finding underscores the complex challenges faced by Asian international students in the U.S., not only in navigating their mental health concerns but also in their attitudes toward seeking help. This complexity points to the necessity for a nuanced approach to providing culturally sensitive mental health services tailored to their unique experiences.

Study Aims

Building upon these insights, the present study aims to delve deeper into the underexplored terrain of Asian international students' perspectives on mental health treatment in the United States. Specifically, it seeks to: (1) Quantitatively assess the attitudes of Asian international students towards mental health treatment, examining factors such as gender, the duration of study in the U.S., education level, subjective socioeconomic status, and awareness and accessibility to mental health treatment options. (2) Propose targeted interventions based on the findings, aimed at improving access and effectiveness of mental health services for Asian international students. While related studies in Australia (Lamontagne, 2023; Mulder, 2015; Redfern, 2016) have begun to address this topic, the unique experiences of Asian students in the U.S. remain less explored.

Our research is inspired by Xu's (2023) qualitative study, which examined the factors influencing Chinese international students' barriers to psychotherapy in the U.S. Interestingly, Xu identified cultural differences as significant factors affecting attitudes toward mental health treatment, rather than as barriers. Xu also found that accessibility and knowledge about mental health were positively correlated with

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treatment attitudes. As a quantitative extension of this work, our study seeks to enhance understanding of the factors influencing the mental health treatment attitudes of Asian international students more broadly.

We hypothesize that several factors significantly influence Asian international students' attitudes toward seeking mental health treatment. These include gender, which may shape help-seeking behaviors due to societal norms and expectations prevalent in some Asian cultures. The duration of study in the U.S. is also considered a crucial factor, as it could affect levels of acculturation and, subsequently, attitudes toward mental health care. Furthermore, the level of education might influence such attitudes, with higher education potentially linked to increased mental health awareness. Subjective socioeconomic status is expected to play a role, affecting both the affordability of treatment and its perceived value. Equally important are the awareness of and accessibility to mental health treatment options; a lack of these may prevent Asian international students from seeking the help they need. By identifying these factors and understanding precisely how they influence attitudes towards mental health treatment, this study aims to uncover the nuances of mental health care perceptions and identify potential areas for improvement in accommodating Asian international students, particularly for whom English is a second language.

Our findings are expected to lead to the development of culturally sensitive and accessible outreach programs and interventions tailored to the unique needs of Asian international students within college counseling settings. The goal is to bridge between these students and the mental health services available to them, ensuring that interventions are designed with an accurate awareness of the challenges they face. By customizing outreach efforts and services to address the identified factors, we aim to foster more positive attitudes toward mental health treatment among Asian international students. Ultimately, this study seeks to enhance the overall mental health and well-being of this student population in the United States, contributing to a more inclusive and supportive academic environment.

Methods

This study focused on participants who met inclusion criteria. They had to be 18 years of age or older, enrolled full-time in a U.S. educational insti-

tution as international students, and self-identified as ethnically Asian. There were no specific exclusion criteria. Participants were recruited from a selection of one hundred universities across the U.S., which were randomly chosen from a comprehensive list of U.S. institutions. Our research team approached the International Student Office of each selected university via email to request permission to disseminate the recruitment email through their international student listservs. Upon receiving consent from the International Students Office, we distributed a recruitment email to the listservs. This email included a brief overview of the study and a link to the online survey, which was also accessible via a QR code.

Interested participants, upon accessing the survey, encountered a series of self-report questionnaires. These questionnaires were designed to gather socio-demographic data, including gender, age, and subjective socio-economic status. Additionally, the survey included the Attitudes Toward Seeking Professional Psychological Help (ATSPPH) and specific items to assess participants' awareness and accessibility of mental health treatment options. To gain a comprehensive understanding of the participants' mental health context, the survey also inquired about any existing mental health diagnoses and previous experiences with mental health treatment.

The study was conducted under the supervision of a university's Institutional Review Board to ensure ethical compliance. All participants were informed that they could withdraw from the study at any time without any penalty, ensuring their autonomy and respect for their decision-making. Additionally, data protection measures were implemented, with all survey responses stored in a password-protected electronic format on Qualtrics, and personal identifiers such as IP addresses were not collected. This approach guarantees that participants' confidentiality is maintained, and their contributions are securely managed, fostering an environment of ethical integrity in the research process.

A self-administered online questionnaire was developed via Qualtrics, encompassing two sections. The first section solicited sociodemographic information, including age, gender, ethnicity, nationality, and family income. Additionally, it comprised queries concerning the participants' current visa status, their educational institution's location, their year in college, their major, the number of years they have spent in the U.S., and

any previous experiences with mental health treatment. A copy of this measure can be found in Appendix A.

The questionnaire's second portion included items designed to elicit students' attitudes toward mental illness and treatment, utilizing Fischer and Turner's Attitudes Toward Seeking Professional Psychological Help (ATSPPH) scale from 1970. This is a 29-item measure comprised of four factors: recognition of the need for professional psychological help, stigma tolerance associated with psychological help, interpersonal openness about one's problems, and confidence in mental health professionals. This scale is frequently used in the U.S. to examine help-seeking attitudes among diverse racial and ethnic groups, immigrants, and international students. Sample statements include: "I would want to see a counselor if I was worried or upset for a long period of time" and "There are experiences in my life I would not discuss with anyone." Participants rated these statements on a four-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree." The scoring was such that "Strongly Agree" responses were assigned three points, while "Strongly Disagree" responses received one point. The total score for each participant was calculated by summing the points of each item's response. Eighteen items were reverse-coded, with a higher score signifying a more positive attitude toward mental health treatment.

The ATSPPH has demonstrated internal consistency, with coefficients ranging from 0.82 to 0.84 (Elhaïet al., 2008). Its reliability and validity have been established in several studies; for instance, Fischer and Farina (1970) reported high internal consistency reliability coefficients (Cronbach's alpha) ranging from .82 to .93 across various samples. Vogel et al. (2006) found good 1-month test-retest (.80) and internal consistency (.84) reliabilities for the ATSPPH, as it correlated significantly with measures of mental health stigma and help-seeking behavior. Furthermore, the application of the ATSPPH in diverse research settings underscores its versatility and relevance in exploring attitudes toward mental health. By employing this validated scale, researchers can draw insights into the complex dynamics of stigma, cultural variability, and educational impacts on mental health behaviors (McAndrew et al., 2019; Park et al., 2018; Vogel et al., 2013). The decision to utilize the ATSPPH in this research is grounded in its proven capacity to provide reliable and valid measures across different populations and settings.

This choice reflects a methodological commitment to employing tools that not only have strong psychometric properties, but also offer the potential to contribute significantly to our understanding of key factors influencing mental health help-seeking behaviors.

The questionnaire's final section aimed to ascertain students' familiarity with counseling or psychotherapy treatment options. The items in this section were divided into two key areas, encompassing four items on awareness and three items on accessibility. Sample statements included: "I am aware of the mental health services available for students on campus" and "I can access mental health services when needed." Participants rating these statements as "Strongly Agree" were assigned four points, while "Strongly Disagree" responses were given one point. The total score for each participant was calculated by summing the points of each item's response. A higher score indicated greater awareness and accessibility to mental health treatment options. Given the lack of a validated scale specifically designed to assess the awareness and accessibility of mental health resources in a university setting, we developed our own concise survey. This decision ensured our inquiry precisely targeted our research objectives, examining the nuances of students' awareness and access to mental health support within their academic environments. This bespoke approach aligns closely with our research methodology, ensuring that we captured the specific aspects of mental health resource accessibility and awareness among university students, thereby enhancing the study's relevance and accuracy. This measure's full version can be found in Appendix B.

To evaluate the internal consistency reliability, Cronbach's alphas were calculated. We compared ATSPPH scores and awareness and accessibility scores according to participants' characteristics using an independent t-test or one-way analysis of variance (ANOVA). SPSS Statistics 28 (IBM Corp., Armonk, NY) was used to perform all statistical analyses, chosen for its widespread acceptance and reliability within the psychological research community. This software is particularly favored for its comprehensive set of tools that facilitate a broad range of statistical tests, including those employed in our study, thereby ensuring accuracy and efficiency in our data analysis. A p-value less than .05 was considered significant.

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Results

Of the 208 survey responses collected, 47 records were excluded since they did not satisfy the criteria for international students. Additionally, three responses were removed because they did not identify as Asian. Furthermore, 37 participants discontinued the survey after providing demographic information, and five participants bypassed more than eight questions. These instances were regarded as invalid responses and were consequently excluded from the analysis.

After eliminating invalid responses, a total of 116 participants provided valid data for the analysis. The majority (85.3%, $n=99$) were aged between 18 and 26 years old, including 43.1% ($n=50$) in the 18-22 age group and 42.2% ($n=49$) in the 23-26 age group. Meanwhile, 14.7% ($n=17$) were over 27 years old, with 9.5% ($n=11$) in the 27-30 age group and 5.2% ($n=6$) aged 30 or above, indicating their educational level. Approximately 51.7% ($n=60$) of participants were enrolled in graduate schools, slightly more than the 44.8% ($n=52$) who were college students.

In terms of ethnicity, 91.4% ($n=106$) identified as Chinese, 2% ($n=4$) as Vietnamese, 2% ($n=4$) as South Korean, 1% ($n=1$) as Pakistani, while the rest did not specify their ethnicity. Of the participants, 69.8% ($n=81$) identified as female, 25% ($n=29$) as male, and 5.2% ($n=6$) as nonbinary or preferred not to disclose their gender. Geographically, 44.8% ($n=52$) of participants were studying in New York State, with another 12.9% ($n=15$) in California. The top three majors were Psychology (30.2%), Business Management, Marketing, and Related Support (12.1%), and Education (9.5%), covering 18 major categories.

Regarding mental health history, 36.2% ($n=42$) reported prior mental health treatment, 18.1% ($n=21$) had a previous diagnosis of a mental disorder, and 12.1% ($n=14$) reported receiving ongoing mental health treatment. The study participants rated their subjective socioeconomic status (SES) on a scale of 1 to 10, where 10 represented the highest status with the most wealth, education, and prestigious jobs, and 1 represented the lowest status with the least wealth, education, and low-paying jobs or unemployment. On average, participants rated their subjective SES at 6.35, with a standard deviation of 1.41, and a mode of 7.

Table 2 presents the ATSPPH scores based on the participants' characteristics. One-way ANOVA suggested no significant difference was found be-

tween the mean ATSPPH scores of females, males, and the nonbinary/prefer not to say gender group (1.96 vs. 1.85 vs. 1.70, $p=.31$). However, a significant correlation was observed between educational level and ATSPPH scores. Specifically, an independent t-test suggested that participants enrolled in graduate school exhibited significantly higher mean ATSPPH scores compared to their undergraduate counterparts respectively (2.01 vs. 1.82, $p=.004$).

Moreover, the analysis, conducted using one-way ANOVA, revealed a significant correlation between age groups and ATSPPH scores ($p=.036$). Participants aged 30 and above reported the highest mean ATSPPH score of 2.14, with a standard error of the mean (SEM) of .16, suggesting a more positive attitude towards mental health treatment. This was followed by the 23-26 age group, which had a mean score of 2.02 and an SEM of .04. Notably, the 18-22 and 27-30 age groups displayed comparable mean scores of 1.84, with SEMs of .06 and .12, respectively. These findings further emphasize the potential influence of age on attitudes towards mental health treatment.

Although the independent t-test results were not statistically significant, participants with a history of mental health treatment, either past or current, exhibited slightly higher mean ATSPPH scores compared to those without such history (2.00 vs. 1.88, $p=.077$). This observation warrants further investigation in future studies.

Table 3 showcases the item-total correlations and Cronbach's alpha values related to the awareness and accessibility of mental health treatment. The Cronbach's alpha for this entire section was found to be .903, indicating high internal consistency within the section.

Table 4 illustrates the two-tailed Pearson correlation associations between socio-demographic characteristics and ATSPPH scores. Univariate analyses revealed significant positive associations between family income ($r=.243$, $p=.009$) and years spent in the US ($r=.245$, $p=.008$) with ATSPPH scores. Furthermore, the table presents the Pearson correlation between socio-demographic factors and ATSPPH scores, as well as between the awareness and accessibility of mental health treatment. Notably, the number of years spent in the US ($r=.230$, $p=.014$) showed a significant positive association with awareness. Additionally, both awareness ($r=.331$, $p<.001$) and accessibility ($r=.234$, $p=.012$) displayed signifi-

icant positive correlations with ATSPPH scores. Moreover, awareness was significantly and positively associated with accessibility scores ($r=.826, p<.001$).

Discussion

Our findings suggest that certain factors, including higher family income, longer duration spent in the US, enhanced awareness of mental health treatment, and improved accessibility to mental health services, are associated with more positive attitudes towards seeking professional psychological help among Asian international students.

Redefining Gender Norms

The findings of the current study indicate that gender does not significantly influence the attitudes of Asian international students toward seeking psychological help, with female, male, and nonbinary or unspecified gender groups exhibiting similar tendencies regarding mental health treatment. This observation contracts traditional views within Asian cultures, which often depict men as stoic and decisive, burdened with greater social expectations and responsibilities (Kramer, 2002). Such gender norms have been linked to social stigma, potentially informing negative attitudes among men toward mental health treatment (Chatmon, 2020; Livingston, 2018). However, our results indicate a departure from these conventional beliefs, especially among the younger generation of Asian international students. Zhang and Hui (2021) provide corroborating evidence, suggesting that exposure to Western norms among Asian international students might attenuate the influence of traditional gender roles on their help-seeking behavior.

Contemporary research emphasizes the role that educational settings play in transforming beliefs and attitudes. Scholz et al. (2016) assert that environments fostering gender equality and mental health awareness can lessen the impact of deep-seated cultural stereotypes on help-seeking behavior. This finding is supported by Tse and Haslam (2021), who found that Asian international students are likely to adopt help-seeking behaviors within supportive and inclusive academic communities, irrespective of gender. In addition, advancements in mental health advocacy and the proliferation of information through digital media have likely contributed to this trend. Both Niederkröthaler et al. (2014) and Kim (2022) stress the role of online platforms and media in normalizing dis-

cussions around mental health, potentially narrowing the gender gap in attitudes toward seeking assistance.

Given these findings, it seems that the younger, globally-minded Asian international students are embracing more progressive views on mental health, consistent with the inclusive attitudes prevalent in their host nations. This shift implies that while conventional cultural expectations might continue, they are being reshaped by the combined effects of acculturation, the influence of educational environments, and the worldwide discourse on mental health.

However, it is important to point out that the gender imbalance in the study sample, with a higher number of female participants, may suggest inherent differences in help-seeking attitudes between genders among Asian international students. This imbalance could indicate that female students are more willing or able to participate in studies about mental health, reflecting a broader openness towards seeking help or discussing mental health issues. For the study's results, this means conclusions drawn about gender effects on help-seeking attitudes might not fully represent the male and nonbinary perspectives, potentially skewing the perceived shift towards more progressive views on mental health. Further research with balanced and diverse gender representation is crucial to accurately assess these attitudes and their implications in the context of cultural and acculturation influences on Asian international students in the U.S.

Influence of Education on Mental Health Help-Seeking

Our results reveal differences in the willingness to seek mental health assistance across various educational levels, reinforcing the well-established correlation between higher educational attainment and more proactive attitudes toward seeking mental health support (Eisenberg et al., 2007; Eisenberg et al., 2013; Jorm, 2004; Wong et al., 2017). Specifically, our data indicate that individuals engaged in graduate school education are more likely to hold and express favorable attitudes toward utilizing mental health services. This tendency is likely due to the increased exposure to mental health discussions that higher education provides, fostering comfort in seeking help (Farley, 2023). Institutional initiatives, such as university-led mental health awareness campaigns and accessible counseling services, create an environment that normalizes help-seeking behavior (Pace et al., 2016). The academically stimulat-

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ing environment of higher education, which promotes critical thinking and self-reflection, may heighten students' awareness of their mental health needs, and encourage proactive help-seeking (Liu et al., 2021).

Furthermore, in a 2021 report by The National Academies of Sciences, Engineering, and Medicine titled "Mental Health, Substance Use, and Wellbeing in Higher Education: Supporting the Whole Student," the importance of integrating topics of psychological well-being and mental health literacy into the curriculum and classes within higher education institutions is emphasized, further strengthening students' attitudes towards mental health services. The impact of this education is particularly pronounced among Asian international students, who may originate from cultures where open discussions about mental health are less prevalent (Dessauvague et al., 2022). The study result underscores the significant role that educational environments play in shaping the mental health-seeking behaviors of students, with a notable effect on Asian international students who may face cultural barriers to acknowledging and addressing mental health issues.

While it has been observed that higher education levels correlate with positive attitudes toward mental health, and a longer stay in the U.S. enhances mental health awareness among Asian international students, the relationship between these two factors is complex. It is not straightforward to link prolonged U.S. residency with higher education levels due to varied arrival times in the U.S. for education. For example, an individual who came to the U.S. solely for a Ph.D. program might have a five-year stay, whereas another person who arrived during middle school and only completed a bachelor's degree could have resided in the U.S. for a longer duration. Since detailed data on the duration of stay relative to educational attainment is not available, making definitive assumptions about their relationship is challenging. Future research could explore how the length of stay and educational level together impact mental health awareness, considering the diverse educational pathways of Asian international students in the U.S.

Wealth and Wellness

Our study uncovered a significant positive association between family income and Attitudes Toward Seeking Professional Psychological Help (ATSPPH) scores. Students from higher-income families showed more positive attitudes toward seek-

ing mental health treatment. This observation aligns with existing research suggesting that financial capabilities often improve access to mental health care services (Cummings et al., 2013). Families with higher incomes not only have the financial resources to afford mental health treatment, but their children are also more likely to receive a higher level of education. This educational advantage typically fosters a more informed and proactive attitude towards mental health help-seeking (Mackinnon et al., 2010).

The correlation between family income and attitudes towards mental health can be attributed to broader socio-economic factors that shape an individual's access to healthcare and information. According to a longitudinal survey study by Bialowolski (2021), economic stability often correlates with improved mental health literacy, a critical factor in recognizing mental health issues and seeking appropriate help. Additionally, the financial security provided by higher-income families may reduce the stress and anxiety associated with financial constraints, which are known barriers to mental well-being (Knapp & Wong, 2020). Ryu and Fan (2023) found that financial stress significantly impacts students' mental health, indicating that higher family income can indirectly contribute to better mental health by alleviating such stressors.

Furthermore, students from affluent families might have earlier and more frequent exposure to mental health discussions and treatments, either through their family network or community, normalizing the concept of seeking help for mental health issues. Cultural perceptions within one's immediate social circle, including family, significantly influence attitudes towards mental health services (Aarons & Sawitzky, 2006; Turner et al., 2015).

In summary, family income emerges as a pivotal factor in shaping attitudes towards mental health treatment among Asian international students. This underscores the need for comprehensive mental health strategies that consider the socio-economic backgrounds of students to ensure equitable access to mental health resources.

Acculturation and Mental Health Attitudes

Our results indicate that a prolonged stay in the U.S. leads to increased mental health awareness among Asian international students. This increase is not merely a byproduct of time, but is intricately linked to the influence of the American education system,

which prioritizes mental health education and support. U.S. educational institutions proactively offer resources aimed at student well-being, ranging from admission orientations that introduce mental health topics to ongoing support services. Such consistent exposure not only deepens students' understanding of mental health issues but also cultivates a proactive attitude towards seeking help (Eisenberg et al., 2009).

Acculturation plays a pivotal role in this dynamic, serving as a bridge between mere exposure and active integration of healthier attitudes toward mental health. Over time, Asian international students assimilate not just superficial elements of American culture but also its progressive stances on mental health. Research by Knaifel et al. (2022) found that increased acculturation correlates with decreased stigma around mental health, thereby facilitating help-seeking behaviors. The social networks that students develop over time in the U.S. can also influence their attitudes toward mental health. Peer interactions, especially with students who embody more liberal views on mental health, serve as a catalyst for changing perceptions and reducing the stigma associated with seeking psychological help (Makhmud et al., 2022; Sun et al., 2022). Moreover, increased familiarity with the U.S. healthcare system over time can reduce barriers to accessing mental health services. As students become more knowledgeable about available resources and how to navigate the system, their willingness to seek help may increase (Alqassim et al., 2022).

The observed changes suggest that cultural competence in mental health strategies is not just beneficial, but essential. The process through which students' attitudes toward mental health evolve highlights the critical need for culturally sensitive approaches to mental health support. It points to the necessity of designing mental health interventions and resources that are not only accessible, but also resonate with the diverse cultural backgrounds of international students. This perspective encourages a more nuanced understanding of how cultural factors influence mental health awareness and help-seeking behaviors. By fostering an environment that values cultural competence, educational institutions can play a transformative role in supporting the mental well-being of international students, making a case for the integration of cultural sensitivity into all levels of mental health strategy and intervention planning.

We recognize that the predominance of Chinese international students in our sample presents a limitation that may not fully encapsulate the diverse experiences and attitudes toward mental health found across different Asian cultures. This sampling bias indeed restricts our ability to generalize our findings to all Asian international students. However, it also provides a unique opportunity to reflect on the differences within Asian cultures, especially concerning mental health perspectives. For instance, cultural attitudes toward mental health in Chinese society, which are often influenced by Confucian values emphasizing stoicism and familial harmony, might differ significantly from those in other Asian cultures where religion and individualism play a more substantial role (Tung & Li, 2014).

While our study's limited sample size of participants from other ethnicities constrains the statistical power to make broad comparisons, preliminary observations suggest that Chinese international students may exhibit particular coping strategies, stigma perceptions, and help-seeking behaviors that are shaped by their cultural background (Chen et al., 2020). The influence of collectivist values in Chinese culture may lead to a greater emphasis on maintaining social harmony and face, potentially affecting students' willingness to seek mental health support (Gao et al., 2022). In contrast, students from South Asian cultures, where there is a different interplay between individualism and collectivism, or from Southeast Asian countries, where community support systems and religious beliefs might offer alternative coping mechanisms, could exhibit distinct attitudes and behaviors towards mental health challenges (Kim & Lee, 2022; Singal & Chopra, 2023). Given these considerations, it becomes evident that future research must strive for a more diverse representation of Asian international students to explore the intricate ways in which cultural factors influence mental health perceptions and help-seeking behaviors.

In summary, the duration of stay in the U.S. is a significant factor in developing mental health awareness among Asian international students. This relationship underscores the need for educational institutions to continuously engage with international students throughout their educational journey, fostering an environment conducive to mental health awareness and help-seeking. However, it is essential to empirically validate which specific elements of the U.S. education system contribute most significantly to this

heightened awareness. Future research should aim to dissect these aspects to better understand and enhance the support systems available to international students.

Navigating Mental Health Pathways

Our study revealed that heightened awareness and accessibility to mental health services are crucial in shaping positive attitudes toward mental health treatment among Asian international students. Specifically, students who are well-informed about available mental health resources, possess the ability to effectively navigate these resources, and have unobstructed access to services, tend to exhibit more favorable attitudes toward seeking mental health treatment. This correlation underscores the vital role that educational institutions play in providing comprehensive mental health education and ensuring the availability of robust support systems (Lipson, 2014).

Awareness and accessibility are interconnected factors that significantly influence mental health outcomes. A study by Shim et al. (2022) highlighted that knowledge about mental health issues and familiarity with treatment options can significantly reduce the stigma associated with seeking help. When institutions make a concerted effort to provide easily accessible mental health services, they normalize the process of seeking help, thereby encouraging students to take proactive steps toward their mental health. The unique challenges faced by Asian international students, such as cultural barriers and unfamiliarity with the host country's healthcare system, further accentuate the need for targeted mental health initiatives. Martirosyan et al. (2019) suggested that tailored programs that address the specific needs of international students can effectively increase their awareness and utilization of mental health services.

Another critical aspect is the use of technology in improving accessibility. Digital platforms and telehealth services have been identified as effective means to overcome geographical and logistical barriers, providing students with easier access to mental health care (Bulkes et al., 2022; McBain et al., 2023). This approach is particularly beneficial for international students who may face language barriers or have limited transportation options.

In conclusion, our study highlights the significance of awareness and accessibility in fostering positive attitudes toward mental health treatment among Asian international students.

Educational institutions play a crucial role in enhancing these factors through strategic initiatives and resource allocation, ultimately contributing to the mental well-being of this student population.

Conclusion

The current study elucidates the multifaceted factors shaping Asian international students' attitudes toward seeking professional psychological help in the U.S. It reveals not only the significance of socioeconomic status, duration of stay, gender norms, educational attainment, and acculturation but also underscores the paramount importance of mental health awareness and accessibility. Our findings demonstrate a progressive shift away from traditional gender norms, reflecting a broader cultural adaptation among Asian international students influenced by supportive educational environments and acculturation processes. The positive correlation between socioeconomic status and attitudes towards mental health help-seeking highlights it as a critical factor in access to mental health care.

Moreover, the study brings to light how heightened awareness and unimpeded accessibility to mental health services are indispensable in cultivating positive attitudes toward mental health treatment. Students who are well-informed about and able to navigate mental health resources effectively show a greater propensity to seek professional help. This emphasizes the critical role of educational institutions in promoting mental health literacy and ensuring the availability of comprehensive support systems. These findings advocate for a departure from traditional cultural norms and underscore the necessity of implementing supportive, inclusive, and culturally competent mental health strategies within both educational and healthcare settings. As we pivot to the clinical and research implications of our study, it becomes crucial to leverage these insights in devising targeted interventions that address the unique needs of Asian international students. This approach necessitates a nuanced understanding of how cultural, socioeconomic, educational, and systemic factors converge to influence mental health help-seeking behaviors, aiming to foster environments that enhance mental health awareness and ensure equitable access to mental health services.

Clinical and Research Implications

Drawing upon our study's findings, we recommend that university counseling centers and therapists who work with Asian international students imple-

ment outreach programs aimed at boosting mental health awareness through comprehensive, culturally sensitive education and resources. Emphasizing the significance of mental well-being and reducing stigma around seeking help is pivotal, with initiatives potentially encompassing orientation programs, workshops, informational materials, and online resources, as advocated by Reavley et al. (2012). To meet the diverse needs of this demographic effectively, it is essential to tailor services by offering varied workshops or support groups and collaborating with departments such as International Student Services to develop a unified support strategy, as echoed by Pedersen and Pave (2014). Enhancing services' accessibility and affordability, addressing financial constraints through information on insurance and financial aid, and simplifying the access process is critical to overcoming barriers to care, as noted by Komiya et al. (2000). Moreover, partnering with student organizations can lead to more targeted, culturally attuned programming, enhancing the effectiveness of mental health education for Asian international students. This holistic approach, integrating varied services and collaborative efforts, promises a more supportive and inclusive environment conducive to their mental health needs.

To address these challenges effectively, we propose the following detailed action plans and strategies:

Step 1: Developing Culturally Informed Outreach Programs

Assessment of Needs. Conduct surveys and focus groups with Asian international students to understand their specific mental health concerns, preferences for receiving information, and barriers to accessing services.

Program Design. Based on the assessment, design outreach programs that incorporate culturally sensitive materials and resources. These should address common mental health issues, debunk myths and stigma associated with seeking help, and highlight the importance of mental wellness.

Implementation. Launch the programs through various channels, including orientation sessions for new students, workshops throughout the academic year, and online platforms that provide 24/7 access to resources.

Step 2: Tailoring Services to Diverse Needs

Service Diversification. Expand the range of services to include not only traditional one-on-one

counseling, but also support groups, workshops, and seminars that focus on issues pertinent to Asian international students.

Language and Cultural Competency. Ensure that counseling staff are trained in cultural competency and, where possible, provide services in multiple languages or offer interpreter services to mitigate language barriers.

Feedback Mechanism. Establish a system for collecting feedback on the services provided, enabling continuous improvement and adaptation to student needs.

Step 3: Enhancing Accessibility and Affordability of Mental Health Services

Financial Support Information. Clearly communicate information about the cost of services, insurance coverage, and financial aid options for mental health care, including partnerships with community providers for affordable treatment options.

Simplified Access. Streamline the appointment scheduling process and reduce wait times by leveraging technology for booking sessions and offering virtual counseling options.

Community Provider Partnerships. Develop partnerships with local mental health providers to offer extended services to students, ensuring continuity of care for those requiring long-term support.

Step 4: Collaborating with Campus and Student Organizations

Partnership Development. Foster collaborations with campus departments, such as international student services and diversity and inclusion offices, to create a unified approach to supporting Asian international students' mental health.

Student Organization Engagement. Actively work with student organizations, including any Asian student organizations and international student groups, to co-host events, provide culturally relevant programming, and facilitate peer support networks.

Step 5: Integrating Culturally Informed Practices

Training for Counselors and Staff. Implement ongoing training programs on cultural competence, focusing on the unique challenges faced by Asian international students, including those with advanced degrees and other specific groups.

Incorporation of Cultural Practices. Explore the integration of traditional Asian mental health

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practices and perspectives into counseling services, offering a blend of Western and Eastern approaches to treatment.

By systematically implementing these strategies, university counseling centers can significantly improve the mental health support system for Asian international students, fostering a more inclusive, supportive, and culturally sensitive environment. This tailored approach not only aligns with our study's findings, but also sets a foundation for future research and continuous improvement in the delivery of mental health resources.

To ensure these interventions remain effective and responsive, it is crucial to establish mechanisms for ongoing evaluation and improvement. Regular feedback collection from students, staff training updates based on the latest research, and continuous assessment of program outcomes are essential. Incorporating a cycle of evaluation, feedback, and refinement will enable counseling centers to adapt their strategies to meet the evolving needs of Asian international students, demonstrating a commitment to providing the highest level of mental health support. This proactive stance towards constant enhancement ensures that mental health initiatives remain aligned with student needs, cultural shifts, and advancements in psychological research, thereby sustaining a dynamic and effective support system.

Strengths and Limitations

Several limitations may impact the generalizability of the findings from this study, necessitating caution when extending these results beyond the sampled population. Primarily, the recruitment of participants was confined to a limited number of universities, predominantly located in New York and California. Given the unique sociocultural and educational environments of these states, the relatively large percentage of the sample drawn from these locations may introduce a selection bias, limiting the representativeness of the study. This geographic concentration may not fully capture the varied experiences and perspectives of Asian international students across the U.S., making it prudent to apply these findings to other regions or demographics with caution.

The overrepresentation of Chinese international students within our sample poses another significant limitation. While providing variable insights into this subgroup, it might not accurately portray the attitudes and experiences of students from other

Asian countries, potentially skewing the results towards the perspectives prevalent within Chinese student communities. This disproportionate representation underscores the need for a more diverse sample that includes a wider array of nationalities, to ensure a more comprehensive understanding of the mental health attitudes of Asian international students.

Moreover, the cross-sectional nature of this study limits the ability to infer causality or track changes in attitudes over time. The reliance on a survey that, while informative, may not have undergone extensive validation or been widely used in previous research to assess mental health awareness and accessibility among Asian international students, presents a limitation in accurately gauging the effectiveness of existing support structures. The use of a non-validated survey can introduce biases or inaccuracies in measuring the intended constructs, limiting the reliability and generalizability of the results. Potential confounding variables, such as the participants' prior exposure to mental health education, variations in cultural background, and personal experiences with mental health services, were not fully controlled in our method. These factors could influence participants' responses and interpretations of the survey questions, thereby affecting the study's overall conclusions. Longitudinal studies would be required to understand the evolution of mental health attitudes and behaviors as students adapt to their host country's culture and education system. Such an approach would also allow for the examination of how prolonged exposure to the U.S. education system and its mental health resources impacts students from various Asian backgrounds over time.

By acknowledging these limitations, we emphasize the need for caution in generalizing the study's findings beyond the specific universities or states in our sample, or the predominant representation of Chinese students. This acknowledgment is crucial for readers to understand the study's contextual limitations, ensuring a nuanced interpretation of the results. Future research should aim to employ more robust sampling methods to ensure a broader and more representative sample of Asian international students from multiple states and countries.

Implementing stratified or random sampling techniques could help mitigate some of the biases inherent in convenience sampling. Additionally, expanding the geographic scope of the study and including

ing the geographic scope of the study and including longitudinal elements could provide a richer, more nuanced understanding of the mental health attitudes and needs of this diverse student population. Incorporating qualitative research methods such as focus groups or interviews can significantly enhance our understanding of the intricate factors influencing Asian international students' attitudes toward mental health treatment. For instance, insights into the specific cultural misconceptions about mental health can inform targeted educational campaigns, while understanding preferences for certain types of support can guide the development of more effective, culturally sensitive counseling approaches.

Despite the outlined limitations, this study offers data about international students of Asian descent studying in the U.S., explicitly examining their attitudes toward seeking mental health assistance. The research fills a gap in the existing literature, which predominantly focuses on domestic college students. This study's findings illuminate the attitudes of a distinctive group of students who grapple with unique cultural and linguistic barriers. These students may be reluctant to seek mental health assistance due to factors like social stigma. Consequently, the insights offered by the current research are vital for understanding the help-seeking behaviors of Asian international students. They can inform the design of targeted interventions and services to address their mental health needs.

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ASIAN INTERNATIONAL STUDENT MENTAL HEALTH HELP-SEEKING

Appendix A

Eligibility Screening Questions

Are you currently attending school as an international student? (F-1, J-1, etc.)	Yes No
What is your ethnicity?	Asian Black or African American Hispanic or Latino Native American or American Indian Pacific Islander White Other

Demographic Information

What is your age?	18-22 years old 23-26 years old 27-30 years old 30+ years old
What is your gender?	Female Male Others (please specify) Prefer not to say
What is your nationality?	China India Japan Philippines Vietnam Thailand North Korea Singapore Other
This scale from (1) to (10) represents where people stand in society. Number (10) represents the people who are the best off, those who have the most money, most education, and best jobs. Number (1) represents the people who are the worst off, those who have the least money, least education, worst jobs, or no job. Please choose the number that best represents where you think you stand.	(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)
Where is your school located?	(Locations/States)
What is your classification in college?	Freshman/first year Sophomore Junior Senior Graduate student Unclassified

XU

<p>Which of these fields best describes your major, or your anticipated major?</p>	<p>Agriculture, Agriculture Operations, and Related Science Architecture and Related Services Area, Ethnic, Cultural, Gender, and Group Studies Aviation Biological and Biomedical Sciences Business, Management, Marketing, and Related Support Communication, Journalism, and Related Programs Communications Technologies/technicians and Support Computer and Information Sciences and Support Service Construction Trades Education Engineering English Language and Literature/letters Family and Consumer Sciences/human Sciences Foreign Languages, Literatures, and Linguistics Health Professions and Related Programs History Human Services Legal Professions and Studies Liberal Arts and Sciences Studies and Humanities Library Science Mathematics and Statistics Mechanic and Repair Technologies/technicians Multi/interdisciplinary Studies Natural Resources and Conservation Philosophy and Religious Studies Physical Sciences Psychology Science Technologies/technicians Social Sciences Theology and Religious Vocations Transportation and Materials Moving Visual and Performing Arts Others</p>
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ASIAN INTERNATIONAL STUDENT MENTAL HEALTH HELP-SEEKING

Demographic Information (cont.)

How many years have you studied in the USA?	Less than a year 1 year 2 year 3 year 4 year 5 year 6 year 7 year 8 year 9 year 9+ year
Have you ever been diagnosed with a mental disorder before?	Yes No
Have you ever had any mental health treatment before (therapist, medication, interventions etc.)?	Yes No
Are you currently involved in any mental health treatment?	Yes No

Appendix B

Awareness and Accessibility to Mental Health Treatment

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I am aware of the mental health services that are available for students on campus.					
If I feel unwell, I know how to seek credible information about mental health.					
I know how to get the emergency mental health treatment if needed.					
I am aware of the mental health services that are available for me in the community.					
I am able to get access to mental health service when needed.					
I know how to find a therapist in my current location.					
There are no financial barriers for me to get mental health treatment.					
I will miss school classes if I feel mentally unwell.					

ASIAN INTERNATIONAL STUDENT MENTAL HEALTH HELP-SEEKING

Table 1

Social-demographic characteristics and SES of respondents

Social-demographic characteristics		Surveyed respondents (n=116)	
		N	%
Gender	Men	29	25.0
	Women	81	69.8
	Nonbinary/prefer not to say	6	5.2
Age group (years)	18-22	50	43.1
	23-26	49	42.2
	27-30	11	9.5
	30+	6	5.2
Education Level	Undergraduate	52	44.8
	Graduate	60	51.7
	Unclassified	4	3.4
Ethnics	Chinese	106	91.4
	Others	10	8.6
School Location	NY	52	44.8
	CA	15	12.9
	Others	49	42.2
Major	Psychology	35	30.2
	Business	14	12.1
	Education	11	9.5
	Others	56	48.3
Previous Diagnoses		21	18.1
Previous Treatment		42	36.2
Current Treatment		14	12.1
SES Score	1	2	1.7
	3	1	0.9
	4	5	4.3
	5	20	17.2
	6	27	23.3
	7	39	33.6
	8	17	14.7
	9	2	1.7
	10	1	0.9

Table 2*Comparison of ATSPPH according to participants' characteristics*

Characteristics	ATSPPH scores (Mean SD)	<i>p</i>
Gender		
Male	1.85(.07)	.31
Female	1.96(.04)	
Nonbinary/prefer not to say	1.70(.13)	
Age group		
18-22	1.84(.06)	.036*
23-26	2.02(.04)	
27-20	1.84(.12)	
30+	2.14(.16)	
Education Level		
Undergraduate and others	1.81(.05)	.004**
Graduate	1.93(.04)	
Treatment		
Previous Tx	1.99(.06)	.077
No Tx	1.89(.04)	

Note. * $p < .05$, ** $p < .01$

ASIAN INTERNATIONAL STUDENT MENTAL HEALTH HELP-SEEKING

Table 3

Item-total correlations and Cronbach's alphas for awareness and accessibility for mental health treatment (N=116)

Items	Item-total correlation	Cronbach's α
I am aware of the mental health services that are available for students on campus.	0.807	0.903
If I feel unwell, I know how to seek credible information about mental health.	0.849	x
I know how to get the emergency mental health treatment if needed.	0.814	x
I am aware of the mental health services that are available for me in the community.	0.829	x
I am able to get access to mental health service when needed.	0.881	x
I know how to find a therapist in my current location.	0.828	x
There are no financial barriers for me to get mental health treatment.	0.631	x
I will miss school classes if I feel mentally unwell.	0.563	x

Table 4*Association between characteristics variable and ATSPPH scores*

Column Label	ATSPPH r value	<i>p</i>
Family Income	.243	0.009**
Years in US	.245	0.008**
Awareness	.331	<0.001**
Accessibility	.234	0.012*
	Accessibility r value	<i>p</i>
Awareness	.826	<0.001**

Note. * $p < .05$, ** $p < .01$

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