The Impact of Personality on College Student Connectedness, Course Satisfaction, and Mental Well-Being

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Abstract
The adaptability of college students during the academic paradigm shift caused by the COVID-19 pandemic is important to investigate in order to understand how we can encourage positive and healthy experiences for students. This study focused on analyzing the relationships between personality traits (extraversion, openness to experience, shyness) and college connectedness, course satisfaction, mental well-being, and desire to be more connected to college. Participants included 209 randomly selected students aged 18 years or older recruited from a community college in the Midwest. Participants completed a 150-item self-report survey in March 2022 that assessed the variables using standardized measures. As expected, correlational analyses found that extraversion had a significant positive relationship with college connectedness and mental well-being. However, we did not find significant relationships between extraversion and course satisfaction or desire to be more connected. Consistent with our hypothesis, openness had a significant positive correlation with each of the variables but was assessed cautiously due to a low alpha level. As expected, shyness had a significant negative correlation with college connectedness, course satisfaction, and mental well-being, but not with desire to be more connected. In studying personality as a static trait, we can better understand that extraverted, open, and shy individuals tend to maintain levels of college connectedness, satisfaction, and mental well-being even when unexpected turmoil (e.g., a pandemic) occurs. Future research can investigate how educators can adjust the culture of their courses to accommodate personality variation among students and develop personality-specific ways to strengthen the adaptability of college students.

Keywords: college connectedness, course satisfaction, mental well-being, personality, COVID-19
In March 2020, the world was flipped on its axis from the effects of COVID-19. This forced the academic realm to adapt to the drastic changes of an online-only education system, a change which proved difficult for students and faculty throughout all education levels. College students in particular were forced to adapt to a world of online-only courses while simultaneously adjusting to adult life. The sudden decrease in social interaction due to the pandemic has resulted in an increase in anxiety, depression, loneliness, anger, and substance abuse by adults around the globe, including college students (Browning et al., 2021; Sifat, 2020). When studying the adaptability of students in response to the pandemic, it is important to consider individual differences, such as the effect of personality traits. As part of this study, we analyzed the impact extraversion, openness to experience, and shyness have on student college connectedness, course satisfaction, and mental well-being, particularly within the context of the pandemic and the need to adapt to it.

Whether taking classes in-person or online, it is important for students to feel connected and satisfied with their college in order to have a positive academic experience. Connectedness suggests having a positive emotional relationship with students, faculty, and the school itself (Gao et al., 2022). Being satisfied with one's college may depend on how connected students feel with their school and the relationships created within one's college environment (Jorgenson et al., 2018). Having a high-quality social life and sense of support enhances students’ sense of connectedness to their college and has been found to be associated with decreased substance abuse, risk of violent behavior, and depressive symptoms, as well as an increase in physical and mental well-being (Jorgenson et al., 2018). Faculty can manifest students’ sense of connectedness and satisfaction to their school by providing emotional support and motivation through the promotion of academic engagement. (Gao et al., 2022; Jorgenson et al., 2018). This can be useful in the adjustment to an online-modality so that students remain feeling connected and supported when challenging times present such as COVID-19 occur. Further, college connectedness is related to successful adjustment to the college environment and is positively related to one’s well-being (Blau et al., 2016) and college satisfaction is positively related to life satisfaction (Lounsbury et al., 2005). Social adjustment and mental well-being in college are factors that are believed to impact the future development of students as well as their college experience (Gao et al., 2022). Subjective well-being consists of a general sense of one’s overall life satisfaction, tendency to experience positive emotions, and an overarching sense of happiness (Zhang & Renshaw, 2019). Some predictors of mental well-being in college students are physical activity, tobacco use, depression, the receiving of mental health services, and quality of sleep (Ridner et al., 2016). Poor subjective well-being can result in several mental and behavioral issues such as depression, anxiety, suicide, and substance abuse (Morton et al., 2017; Zhang & Renshaw, 2019).

Common in the research literature, college connectedness, satisfaction, and mental well-being are important aspects to college students’ experiences and are influenced by the personality traits extraversion, openness, and shyness. Extraversion, the trait in which people are more outgoing and enjoy social interaction (Audet et al., 2021), must be examined to understand how a drastic change in social life can affect one’s college experience. Jorgenson et al. (2018) found that connectedness can be promoted through student academic involvement including campus events and clubs, as well as relationships with peers and faculty. Students with a high degree of college connectedness also show high connectedness with their peers, which is an aspect of college that extroverted individuals find easier (Jorgenson et al., 2018). Student satisfaction, found to be significantly related to extraversion, can be developed within interpersonal relationships and social bonds as well (Lounsbury et al., 2005). Further, Kohút et al. (2022) found that extraversion is a significant predictor of subjective and psychological well-being.
Openness is an intellectual curiosity in which people tend to seek out new experiences and can smoothly adapt to change (Audet et al., 2021). Examining openness alongside college connectedness, course satisfaction, and mental well-being provides this study with a deeper understanding of adaptability to extreme change since students who are open to experience may use their curiosity as they enter and become involved in an unfamiliar environment. Feeling connected to one’s college involves interaction within academics, and an engagement in extracurricular activities, groups, or research (Jorgenson et al., 2018). Finding connection to the college experience leads to students feeling further satisfied with it; Lounsbury et al. (2005) explained that a student’s development and satisfaction with each aspect of their college experience may be dependent on who they are when entering college. Therefore, a student who has a strong openness to experience may find course satisfaction despite changing external situations. Furthermore, Audet et al. (2021) found a strong correlation between openness and elevated levels of subjective well-being, which may be interrelated with one’s adaptability to change.

As a temperamental personality trait, shyness describes an individual’s tendency to feel uncomfortable, anxious, cautious, and inhibited in social environments and when faced with perceived social evaluation (Chen, 2021; Gao et al., 2022). Alongside social discomfort, shyness interferes with other aspects of the college experience including course selection and academic performance (Afshan, et al., 2015). Gao et al. (2022) found that shy individuals tend to avoid social situations due to their perceived lack of social skills, resulting in a deficit of the interactions necessary to maintain college connectedness and course satisfaction, which can potentially lead to poor communication and maladjustment. However, they argued that increasing connectedness through emotional support from faculty and peers and promoting academic involvement creates greater mental well-being for shy individuals.

The unexpected development of the Covid-19 pandemic forced students to adjust to an uncontrollable external circumstance. A forced change of educational modality compounded the effects of the Covid-19 pandemic leading to isolation from peers and friends, stress of serious illness, lack of social interaction, and students were faced with rapid change that required adaptability. College connectedness, course satisfaction, and mental well-being are important aspects of the college student experience and differing personality traits may lead to individual differences within these variables. The aim of the current research was to gain insight into the impact of personality traits on these variables (i.e., college connectedness, course satisfaction, mental well-being) which may in turn offer insight to colleges and students regarding their experiences during unpredictable times. To this end, the following hypotheses were investigated: student to student and student to faculty college connectedness is positively correlated with extraversion and openness and negatively correlated with shyness (H1); student course satisfaction is positively correlated with extraversion and openness and negatively correlated with shyness (H2); student mental well-being is positively correlated with extraversion, openness, and shyness (H3); and desire to be more connected to the college is positively correlated with openness and negatively correlated with extraversion and shyness (H4).

Method

Procedure and Participants

At the time of data collection in March of 2022, the community college of interest was not back in pre-pandemic mode, and instead most psychology classes were being offered remotely (72%). This compares to prior to the pandemic (March of 2019), when 49% of psychology classes were offered online and 51% were in-person. After receiving approval from the community college’s Institutional Review Board, participants were recruited from in-person or online psychology courses and were offered extra credit at the discretion of their instructors. Adapted from the Psi Beta
National Research Project, the current research assessed the variables college connectedness and personality (extraversion, openness to experience, shyness), variables that were part of the original research study, and the variables mental well-being and course satisfaction, which were added by the current researchers. After providing informed consent, participants anonymously completed a 150-question self-report survey, and each scale was scored and recorded anonymously to ensure participant confidentiality. Data was collected from 209 participants (66.50% primarily online; 33.50% primarily in-person) through a random sample of students ages 18 years and older from a community college in the Midwest, with an average age of 24.13 (SD=9.69) and 76.10% identifying as female. Most participants (71.30%) identified as White followed by Hispanic/Latino (7.70%), African American (7.20%), Biracial/Multiracial (4.30%), Asian/Asian American (1.90%), and Middle Eastern (1.90%). Most students (56.00%) were full-time, taking 12 or more credits.

**Measures**

In addition to demographic questions, the Ten Item Personality Inventory (TIPI; Gosling et al., 2003) was used to assess extraversion, a person’s level of social engagement and energy derived from this engagement, and openness to experience, a person’s willingness to try new things and participate in imaginative and intellectual activities. Shyness was measured by the 20-item Cheek Buss Shyness Scale (as found in Weyer & Carducci, 2001), a self-reported measure designed to assess a person’s inclination for social withdrawal. We used the 7-item student to student and the 8-item student to faculty subscales of the self-report College Connectedness Scale (Jorgenson et al., 2018) to measure a student’s feeling of belongingness and having bonding relationships with other students and faculty. Satisfaction with in-person classes and online classes was measured using a 16-item measure (as found in Powell & Rey, 2021) to assess satisfaction with class structure, types of interactions possible, and learning. The 7-item Short Warwick-Edinburgh Mental Well-being Scale (Stewart-Brown et al., 2009) was used to assess a student’s mental health and well-being in a non-clinical setting. Internal consistency estimates for our study can be found in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CC–student/student</td>
<td>.91</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.93</td>
<td>1.97</td>
<td>1–9</td>
</tr>
<tr>
<td>2. CC–student/faculty</td>
<td>.53**</td>
<td>.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.96</td>
<td>1.96</td>
<td>1–9</td>
</tr>
<tr>
<td>3. Extraversion</td>
<td>.20**</td>
<td>.19**</td>
<td>.71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.11</td>
<td>1.59</td>
<td>1–7</td>
</tr>
<tr>
<td>4. Openness</td>
<td>.14*</td>
<td>.22**</td>
<td>.32**</td>
<td>.49</td>
<td></td>
<td></td>
<td></td>
<td>5.21</td>
<td>1.17</td>
<td>1–7</td>
</tr>
<tr>
<td>5. Satisfaction-Overall</td>
<td>.22**</td>
<td>.38**</td>
<td>.11</td>
<td>.15*</td>
<td>.94</td>
<td></td>
<td></td>
<td>3.07</td>
<td>0.53</td>
<td>1–4</td>
</tr>
<tr>
<td>6. Shyness</td>
<td>-1.18**</td>
<td>-2.02*</td>
<td>-5.99**</td>
<td>-2.99**</td>
<td>-2.25**</td>
<td>.93</td>
<td></td>
<td>3.01</td>
<td>0.85</td>
<td>1–5</td>
</tr>
<tr>
<td>7. Well-being</td>
<td>.14*</td>
<td>.24**</td>
<td>.19**</td>
<td>.17*</td>
<td>.32**</td>
<td>-.43**</td>
<td>.82</td>
<td></td>
<td>3.37</td>
<td>0.66</td>
</tr>
</tbody>
</table>

*p < .05. **p < .01. CC = College Connectedness. Coefficient alphas are presented along the diagonal. The means and variability of our measures are reasonable, and except for openness to experience which was lower at alpha of .49, all coefficient alphas are at the acceptable level of .70 or higher (Nunnaly, 1978).
Results

Table 1 shows the descriptive statistics, coefficient alphas, and intercorrelations for all study variables. Notably, college connectedness (both student to student and faculty to student), course satisfaction, and mental well-being were all positively correlated. Using correlational analysis to evaluate all hypotheses, results demonstrated that extraversion had a significant positive correlation with student to student \((r(207) = .20, p = .003)\) and student to faculty \((r(207) = .19, p = .005)\) college connectedness and mental well-being \((r(207) = .19, p = .007)\). Extraversion was not significantly correlated with course satisfaction or the desire to be more connected to the college. Openness had a significant positive correlation with student to student college connectedness \((r(207) = .14, p = .040)\), student to faculty college connectedness \((r(207) = .22, p = .002)\), course satisfaction \((r(207) = .15, p = .031)\), mental well-being \((r(207) = .17, p = .012)\), and desire to be more connected \((r(207) = .16, p = .022)\). Shyness had a significant negative correlation with student to student \((r(207) = -.18, p = .007)\) and student to faculty \((r(207) = -.20, p = .003)\) connectedness, course satisfaction \((r(207) = -.25, p < .001)\), and mental well-being \((r(207) = -.43, p < .001)\). Shyness was not significantly correlated to the desire to be more connected to the college.

Discussion

The consequences stemming from the COVID-19 pandemic have negatively impacted the mental health of college students around the globe. Studies have found an increase in issues such as anxiety, depression, loneliness, anger, and substance abuse due to increased social isolation (Browning et al., 2021; Sifat, 2020). To improve these negative mental health outcomes, we must better understand students as they adapt to dramatic shifts. The aim of the present study was to gain insight on the impact of extraversion, openness to experience, and shyness on the college experience including student to student and student to faculty college connectedness, course satisfaction, and mental well-being. As hypothesized, we found support for personality being differentially related to these important outcome variables. In concurrence with Jorgenson et al. (2018), our results show that extraverted individuals are more likely to feel connected to their college as these individuals find it easier to connect with their peers and faculty. These connections as well as involvement in extracurricular activities increase college connectedness and college and course satisfaction (Jorgenson et al., 2018). We also found a positive relationship between college connectedness and course satisfaction. Results also show that extraversion was not significantly correlated with the desire to be more connected. Because extraversion is positively correlated with college connectedness, extraverted individuals are already active in maintaining connectedness and therefore may have no desire to increase it. Surprisingly, extraversion and course satisfaction were not significantly related, which may indicate that course satisfaction simply has less to do with being extroverted, and more to do with course structure.

Like extraversion, previous literature suggests that being open to new experiences aids in finding satisfaction in college as well as feeling connected within it (Lounsbury et al., 2005). Our results align as we found that openness has a positive relationship with both student to student and student to faculty connectedness and course satisfaction. These results may stem from the attitude or demeanor that open individuals maintain which encourages them to partake in new experiences and new relationships, building greater connections and satisfaction. Our findings indicate that open individuals are more likely to desire to be more connected, perhaps because they are more open to the idea of continuing to increase their connections. Furthermore, like extraversion, open individuals are more likely to seek out social situations, so there are more opportunities for the positive experiences that make up a healthier subjective mental well-being (Zhang & Renshaw, 2019). Our results agree with those of...
Kohút et al. (2022) and Audet et al. (2021) in finding that both extraversion and openness correlate to a positive mental well-being.

Our hypothesis that shyness would be positively correlated with mental well-being was formed under the expectation that perhaps shy individuals are comfortable at their level of social interaction and hold adequate levels of mental well-being. However, results found shyness to be negatively correlated with mental well-being, college connectedness, and course satisfaction. The study by Gao et al. (2022) explained that the negative correlations of shyness with these variables may stem from the lack of initiation and interaction put forth by shy individuals. Furthermore, Jorgenson et al. (2018) argued that the level of connection that students feel with their school and those within it may impact students’ satisfaction with their school. By increasing college connectedness in shy individuals through academic involvement and interaction, satisfaction and mental well-being may increase due to the interrelation of these variables. Surprisingly, our results show no significant relationship between shy individuals and the desire to be more connected. This result may reintroduce the idea that perhaps some shy individuals are satisfied with their level of connection and do not desire to increase it.

When the COVID-19 pandemic hit, students had to adjust to a new way of learning, socializing, and navigating their world. Unfortunately, the fallout that ensued resulted in increased mental health issues around the globe (Browning et al., 2021; Sifat, 2020). In studying personality traits, we can gain further insight into their role in how students adapt to difficult paradigm shifts. This information can further aid students towards a positive college experience. As personality is relatively static, the effect of traits on aspects of the college experience goes beyond a student's college years. In learning how to maintain college connectedness, course satisfaction, and mental well-being, students can take these skills and use them after college to improve their relationships, mental health, and adaptability.

The results of our study can help better understand how extraverted, open, and shy individuals maintain levels of college connectedness, course satisfaction, and mental well-being during difficult paradigm shifts.

Limitations and Suggestions for Future Research

All research has limitations, and this study is no different. First, the sample participants identified mostly as white (71.30%) and female (76.10%), which is not representative of the population and can lead to an increased risk of sampling error. Second, the coefficient alpha for openness to experience was low, indicating that the results should be interpreted with caution and further investigated. Third, course modality was not the focus of this study, even though there were more online participants than in-person, which may have impacted the results. Finally, we used a self-report survey which assumed participants can accurately identify their attitudes and feelings. Despite these limitations, our findings provide insight that can be expanded by developing more personality-specific ways in which colleges can strengthen the adaptability of students when challenging times arrive. Further research can determine if certain personality traits provide more resiliency than others during times of stress, which can potentially assist mental health care on college campuses to better adjust methods to support students. Future research should use a more extensive measure of openness to experience to gain better reliability, and examine modality differences in connectedness, course satisfaction, and mental well-being and how personality might impact these differences. With the lack of literature addressing a student’s desire to be more connected to their college and our addition to this knowledge, future research is needed on this topic. Our findings indicate that personality matters in peer and faculty connections, course satisfaction, and student mental well-being. Future research could investigate how teachers can adjust their course culture to accommodate personality differences among their students, particularly during
paradigm shifts where students’ adaptability is necessary. Students need support when experiencing unprecedented challenging times, so a focus on personality-centric care may be essential to ensure a healthy student body.

References
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The Value of Honor Society Participation: Is There a Relationship Between Honor Society Participation and Belief in Psychological Myths?

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Abstract
Psychological myths have become so widespread in both the general public as well as higher education undergraduate communities that it has been damaging to the psychology field (Gaze, 2014; Kowalski & Taylor, 2009; Meinz et al., 2022). Factors such as education, belief in psychology as a science, and their confidence in their myth beliefs (myth confidence) have previously been examined in relation to myth endorsement (Bensley & Lilienfeld, 2015; Richardson & Lacroix, 2021). However, there has been no previous research focusing on the connection between honor society membership and myth belief. The present study examined whether honor society participation could predict to myth belief. To better understand belief in psychological misconceptions, this study also measured the participants' belief in psychology as a science and confidence in myth beliefs. Understanding myth belief predictors may help psychologists mitigate the spread of psychological myths. A total of 972 participants from 2-year colleges across the United States were recruited to take a survey regarding psychological myths. We compared myth belief, belief in psychology as a science, and myth score confidence between two groups: honor society members (N = 129) and non-honor society members (N = 807). Non-honor society members identified significantly fewer myths than honors society members, were less confident when correctly identifying myths than honor society members, and had lower belief in psychology as a science than honor society members. These findings suggest that honor society membership may be a predictor of myth detection. This finding is possibly due to honor society eligibility requirements, such as grades and credits taken. Our results may be useful in developing academic interventions to prevent psychological myth belief.

Keywords: myth belief, honor societies, psychology as a science, psychological misconceptions

Psychology is often misrepresented as an unreliable art rather than a field of science (Gaze, 2014; Richardson & Lacroix, 2021). Such perceptions make it easy to be dismissive and doubtful of research emerging from the field. This is exacerbated by the numerous psychological myths being spread in everyday life, perpetuating distrust, and misinformation. These misconceptions are
damaging to the science of psychology and the population as a whole (Cavazos et al., 2021). Psychologists have been studying these misconceptions to identify their underlying causes, and, more importantly, to explore strategies to reduce them.

Education is often believed to be a primary tool for combating myth beliefs (Macdonald et al., 2017; Richardson & Lacroix, 2021; Standing & Huber, 2003). Unfortunately, past studies demonstrated that taking only introductory psychology courses was not effective in reducing belief in psychological misconceptions (Gaze, 2014; Kowalski & Taylor, 2009; Meinz et al., 2022; Richardson & Lacroix, 2021; Sibicky et al., 2020; Standing & Huber, 2003). However, taking more psychology courses had a greater effect in reducing psychological misconceptions (i.e., misinterpreting theories), though participants still scored low on identifying psychological myths (i.e., a theory with lacking evidence or is proven false; Gaze, 2014).

Kowalski and Taylor (2009) concluded that the best way to reduce misconceptions in an introductory course was to specifically call out the misinformation and provide the proper evidence and time to dispute it. The issue with this method is that it requires each myth to be pointed out and disproven; devoting time to covering each misconception and providing contrary evidence is an inefficient and unrealistic expectation to hold in an introductory psychology course.

Due to the challenge of disproving psychological myths, this study’s purpose was to understand the connection between honor society participation and belief in psychological misconceptions. Current literature does not have extensive research in this area. Honor societies often require the students to have a minimum GPA to participate, and past research demonstrated that a higher GPA predicted better accuracy at identifying myths (Cho, 2022). Since more education seems to reduce misconceptions, it was hypothesized that there would be a difference in myth scores between students who are in an honor society and students who are not in an honor society (Gaze, 2014; Macdonald et al., 2017; Meinz et al., 2022). Second, it was hypothesized there would be a difference in myth score confidence between students who are in an honor society and students who are not in an honor society. Finally, it was hypothesized there would be a difference in belief that psychology as a science between students who are in an honor society and students who are not in an honor society.

**Method**

**Participants**

Nine-hundred seventy-two participants from United States community colleges participated. Participants had an average age of 22. Participants filled out information involving their gender, race/ethnicity, socioeconomic status, and their participation in honor societies.

**Materials**

The Psychology as a Science (PAS) scale (Friedrich, 1996) was used to measure belief in psychology as a science. Scores were calculated by taking participants’ average PAS scores, which were reported on a scale from one to seven. The PAS score was measured on a 7-point Likert scale, from 1 (Strongly Disagree) to 7 (Strongly Agree) based on statements that supported or did not support that psychology as a science.

Participants’ myth belief was measured through a series of true/false questions, each regarding a psychological misconception (see Table 1 for a full list of misconceptions). This created a myth score, which calculated the sum of the total number of true/false questions participants answered correctly.

Myth confidence was measured on a scale from 1 (not at all confident) to 7 (very confident), asking participants to rate their confidence in their answers to each myth. The myth confidence score was calculated by giving participants one point for each myth question they answered correctly, then multiplied by the indicated confidence value.
### Table 1

_Psychological Myths and Misconceptions Included in the Survey_

<table>
<thead>
<tr>
<th>Myths and misconceptions</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you're unsure of your answer when taking a test, it's best to stick with your initial hunch.</td>
<td>False</td>
</tr>
<tr>
<td>We dream every night even if we don't always recall the dreams.</td>
<td>True</td>
</tr>
<tr>
<td>Individuals seldom repress memories of traumatic experiences.</td>
<td>True</td>
</tr>
<tr>
<td>People only use 10% of their brain's total processing capability.</td>
<td>False</td>
</tr>
<tr>
<td>Men and women communicate in completely different ways.</td>
<td>False</td>
</tr>
<tr>
<td>It's better to express anger openly to others than to hold it in.</td>
<td>False</td>
</tr>
<tr>
<td>Eyewitness testimony is a highly accurate and reliable method for identifying criminal suspects.</td>
<td>False</td>
</tr>
<tr>
<td>Academic performance is significantly improved when teaching styles are matched to student learning styles.</td>
<td>False</td>
</tr>
<tr>
<td>A person's handwriting is not a valid and reliable indicator of their personality traits.</td>
<td>True</td>
</tr>
<tr>
<td>Recently, there has been a massive epidemic in infantile autism.</td>
<td>False</td>
</tr>
<tr>
<td>Dream interpretation is a valid and reliable method for revealing people's unconscious motivations and desires.</td>
<td>False</td>
</tr>
<tr>
<td>Psychiatric hospital admissions and crimes do not increase during full moons.</td>
<td>True</td>
</tr>
<tr>
<td>Playing classical music (e.g., Mozart) to infants and children produces long-lasting increases in their intelligence.</td>
<td>False</td>
</tr>
<tr>
<td>On average, people are romantically attracted to individuals who differ from them in their personality, interests, and attitudes.</td>
<td>False</td>
</tr>
</tbody>
</table>
Procedure

Data collection started after approval from the local Institutional Review Board. To protect the integrity of the data, the data was coded after cleaning. Eleven responses were removed for not giving consent, 49 were removed for being under the age of 18, and four were removed for not rounding their age to the nearest whole number. One respondent was removed for not attending a college, six were removed for having six or more missing responses, and 142 respondents were removed for not taking the survey at the college. One response was removed for taking the reflective thinking exercise twice.

This study was conducted through a national survey. The research survey was created by Psi Beta’s National Council using Google Forms. The survey included a multiple-choice reflective thinking exercise, true/false statements testing participants’ knowledge of psychological myths, and several Likert scales measuring participants’ confidence in their knowledge and belief in psychology as a science. The survey also included demographic questions, such as honor society membership, gender, race/ethnicity, and socioeconomic status. There were two fill-in-the-blank questions regarding age and number of psychology courses completed.

Instructors were asked via email to recruit students to participate in in-person survey sessions. Survey sessions were held in computer labs on campus with a researcher present to discourage participants from looking up answers or multitasking. Instructors decided whether or not to reward participants with course credit or extra credit for their participation.

An informed consent statement was attached at the beginning of the survey, which participants read and agreed to before clicking “Next” to take the survey. There was no penalty for opting out, and students could stop the survey at any time. No names or email addresses were collected. To prevent potential reinforcement of misinformation, participants were debriefed after completing the survey. Participants were given a debrief to read, which outlined the current research regarding each myth that appeared in the survey. The debrief gave participants corrective information on each of the psychological misconceptions that appeared in the study.

Results

To test all three hypotheses, data were collected from 129 honor society members and 807 non-honor society members. Data was not used from participants who were unsure of honor society participation.

The first hypothesis was that honor society members differ from other college students in their myth score accuracy. Participants’ average myth score was 5.95 (SD = 2.11) out of 16. An independent samples t-test revealed a significant difference between the groups, \( t(934) = -4.03, p < .001, d = -0.38 \). Honor society members correctly identified more myths (\( M = 6.64, SD = 2.15 \)) than non-honor society members (\( M = 5.84, SD = 2.08 \)).

The second hypothesis was that honor society members differ from other college students in their myth score confidence. Students’ average myth score confidence was 30.80 (SD = 12.60). An independent samples t-test found a significant difference between the two groups, \( t(934) = -4.15, p < .001, d = -0.39 \). Honor society members had higher confidence in their correct myth score answers (\( M = 35.00, SD = 12.80 \)) than non-honor society members (\( M = 29.00, SD = 12.40 \)).

An independent samples t-test was used to test the hypothesis that honor society members differ from non-honor society members in their belief in psychology as a science. Students’ average PAS score was 5.16 (SD = 0.64) on a scale from one to seven. The independent samples t-test found a significant difference between the two groups, \( t(934) = -6.29, p < .001, d = -0.60 \). Honor society members had a greater belief in psychology as a science (\( M = 5.48, SD = 0.67 \)) than non-honor society members (\( M = 5.11, SD = 0.63 \)).
Discussion

Overall, students who were part of an honor society were more likely to have greater belief in psychology as a science, were more accurate in identifying psychological myths, and had more confidence when correctly identifying myths. Since previous research found a positive correlation between the amount of education in psychology and reduced myth belief, this may suggest that honor societies provide a step further in educating and disproving myths (Gaze, 2014; Kowalski & Taylor, 2009; Meinz et al., 2022; Richardson & Lacroix, 2021; Sibicky et al., 2020; Standing & Huber, 2003; Furham & Hughes, 2014). Most honor societies have requirements to join (e.g., academic performance, such as grade point average), and since they are extracurricular programs, honor society members tend to be students already doing well in academic settings. Honor societies provide students with opportunities to connect with other students, professors, work, projects, and so forth. These opportunities may be why honor society students correctly identified more myths. Additionally, there may be a link between students who see value in joining honor societies and being more likely to perceive psychology as a science.

Limitations

The sample was composed only of community college students in the United States, this limits generalizability and makes it unreasonable to generalize the results to the public or to citizens in other countries. Additionally, there is a lack of research regarding the interaction between psychological misconceptions and honor society membership that requires further research to understand. Finally, the survey did not ask participants which honor society they were a member of, the requirements for joining the honor society, their academic performance, or their involvement in other extracurricular activities. Future research should add these variables for further study to better understand the factors that predict myth beliefs.

Our study underscores the importance of honor societies and improved education in fostering a more accurate understanding of psychology as a science and dispelling myths. The data suggests that honor society participation may be an effective strategy for challenging misconceptions. Despite the limitations, including the focus on United States community college students, this study contributes to a better understanding of the complex dynamics of myth belief and myth debunking in psychology. More broadly, these findings echo the importance of robust education in fighting misinformation. Since these misconceptions are damaging to the reputation of psychology as a science and harmful to the general public, it is important for scientists to understand what causes people to hold these misconceptions and factors that help dispel or even prevent the myths (Cavazos et al., 2021; Gaze, 2014; Richardson & Lacroix, 2021). By investing in high-quality educational experiences, such as those offered by honor societies, may be helpful for dispelling harmful misconceptions that can impede progress in psychology and in all scientific fields.

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Exploring the Relationship Between a Cognitive Reflection Test and the Psychology as a Science Scale

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Abstract
Although the field of psychology was not originally approached systematically, the scientific method is now applied in order to evaluate psychological theories. To further the body of knowledge concerning the public perception of psychology as a science, community college students were recruited for the Psi Beta National Research Project questionnaire that included the Psychology as a Science Scale (PAS) and the Cognitive Reflection Test 2 (CRT-2). Participants received the CRT-2 at either the beginning or midway through the questionnaire, depending on the last digit of the participant’s phone number. The prediction that individuals who received the CRT-2 earlier would score differently on the PAS than those who received it later was not supported. Additionally, the prediction that individuals who are more analytical would score higher on the PAS Scale was supported. The aim of this study was to offer supporting data to further the understanding of the influences of cognitive reflection and public perception of psychology as a science. Implications of these findings may include the recognition of the role cognitive reflection may play in decision-making and provide supporting evidence of the potential for correcting detrimental misconceptions of psychology as a science. Suggestions for future directions include focusing on the relationship between CRT-2 and PAS scores and having more than three CRT-like questions to allow for a more sensitive measure of analytical and intuitive responses.

Keywords: cognitive reflection, CRT-2, analytical thinking, intuitive thinking, psychology as a science
origins in physiology. Older sciences such as physics, chemistry, and biology have had more time to develop and collect data, allowing them to separate themselves from their pre-science days and reinforce their legitimacy as sciences. Psychology, as a younger field of study, despite meeting established criteria for a scientific discipline, still struggles to be recognized as a science. Public perceptions of psychology's scientific credibility vary widely (Ferguson, 2015; Lilienfeld, 2012), which impacts aspects of the field such as funding, policy, and community access (Lilienfeld, 2012; Price, 2011). Moreover, the public or policymakers may undervalue psychological research findings in critical decision-making if psychology is perceived as non-scientific. Stereotypes labeling psychology as unscientific can adversely impact research funding, as resources are often allocated based on perceived scientific merit (Lilienfeld, 2012). Lack of funding can stifle innovative research, limiting insights into human behavior, cognition, emotion, and social interaction, and valuable findings regarding issues such as mental health, education, and workplace efficiency may accordingly be underutilized. Research suggests that individuals who utilize more cognitive reflection tend to hold more pro-scientific beliefs across other domains such as biology and astronomy (Pennycook et al., 2022), and are more inclined to reject unsubstantiated claims, including false news stories (Pennycook & Rand, 2019), and stereotypes (Hammond & Cimpian, 2017).

Cognitive reflection is defined as the ability to bypass an intuitive incorrect response and use analytical reasoning to find the correct response (Fredrick, 2005). Within the structure of the dual-process theory of decision-making, an intuitive response is considered nonconscious, automatic, and the fast “default” response (Type 1 processing; Evans & Stanovich, 2013, p. 227); an analytical response is reflective, requiring conscious thought and cognitive effort, which is typically a slower process (Type 2 processing; Evans & Stanovich, 2013). Due to the reflective and deliberate nature of analytical reasoning, an individual who tends to be more analytical may view psychology as more scientific, recognizing that psychology meets the requirements for science. Alternatively, those who tend to use intuitive reasoning may rely on their heuristics and biases of psychology, leading to the stereotype that psychology is not a science because it does not look like sciences such as physics or chemistry. Some evidence suggests that individuals who rely more on intuition may view psychology as less scientific (Amsel et al., 2011; Sibicky et al., 2020). In addition to the influence of intuition on perceptions of psychology's scientific nature, it is important to consider another factor: response or context effects. These effects arise from the analysis and impact of stimuli based on prior experiences. Question order, in particular, plays a significant role, as receiving certain questions before others can elicit different responses (Stark et al., 2018). For example, receiving certain measures in a questionnaire before others may affect how an individual approaches the rest of the questionnaire. Factors such as the environment in which a study is administered can also affect an individual's performance as a result of priming, anchoring, framing, or other contextual cues.

The present study assessed an individual's cognitive processes, perception of psychology as a science, and potential order effects. We assessed an individual’s cognitive processes with the use of the Cognitive Reflection Test 2 (CRT-2; Thomson & Oppenheimer, 2016). An individual's beliefs about the scientific nature of psychology were assessed with the use of the Psychology as a Science (PAS) Scale (Friedrich, 1996), which asked participants to rate their responses to statements about psychology. The CRT-2, in particular, may encourage an individual to use cognitive reflection and prompt analytical reasoning throughout the remainder of the study questionnaire. We hypothesized that individuals who received the CRT-2 earlier would score differently on the PAS Scale than those who received it later due to context effects. Additionally, we hypothesized that individuals who are...
more intuitive would score lower on the PAS, while individuals who are more analytical would score higher.

Method
Participants
The research study included an original sample of 1,212 college students from over 25 community colleges and used data from 1,110 participants who fully completed the survey. Participants were between the ages of 18-70 ($M = 22.60; SD = 7.72$). Individuals who did not give consent, were under the age of 18, and/or had incomplete/invalid data were excluded. Gender responses included 61.5% women ($n = 683$), 33.2% men ($n = 369$), 3.4% non-binary/nonconforming ($n = 38$), 0.1% genderfluid ($n = 1$), 0.8% transgender ($n = 9$), and 1.0% prefer not to answer ($n = 10$). Racial demographic responses included 40.8% White/European American ($n = 453$), 25.8% Hispanic/Latino ($n = 286$), 12.4% Asian/Asian American ($n = 138$), 8.2% Black/African American ($n = 91$), 7.2% Mixed race ($n = 80$), and 4.4% other responses ($n = 47$).

Procedure
This study used data from the National Research Project (2022-2023; NRP) study designed by Psi Beta’s National Research Committee. The questionnaire was distributed by sharing an electronic link to participating chapters across the nation. The first question on the questionnaire obtained informed consent, and participants were debriefed following data collection, in compliance with the requirements of the Institutional Review Board (IRB# DES-4081). Each participating chapter was required to recruit a minimum of 30 participants to gain access to the full data set. Participating chapters were instructed to collect data in a computer lab on their community college campuses to prevent participants from looking up the answers. Data collection occurred from November 1, 2022, to February 15, 2023. The NRP questionnaire consisted of three measures: the CRT-2, the PAS Scale, and a Psychological Belief (PB) Scale. The order of the measures received varied depending on the last digit of the participant’s phone number, with 0-4 receiving the CRT-2 first, then the PB Scale and PAS Scale. Those with phone numbers ending in 5-9 received the PB Scale first, then the CRT-2 and the PAS Scale. The PB Scale consisted of 14 True/False questions and corresponding confidence scales, derived from Lilienfeld et al.’s (2010) source of psychological myths and misconceptions.

Cognitive Reflection Test 2
Cognitive reflection was measured using the CRT-2, which assessed an individual's ability to override an intuitive but incorrect response and to arrive at an analytical and correct response through cognitive reflection (e.g., “A farmer had 15 sheep and all but 8 died. How many are left?” Intuitive answer: 7; Analytical answer: 8). There were three questions formatted with an analytical answer, intuitive answer, and three other incorrect answers. Participants who gave two or more analytical responses were coded as Analytical, two or more intuitive responses as Intuitive, and all other combinations as Other.

Psychology as a Science Scale
Beliefs about the scientific nature of psychology were measured using the PAS Scale, which consisted of 15 items. It asked participants to rate their response to statements about psychology (e.g., "The study of psychology should be seen primarily as a science.") on a seven-point Likert scale from strongly agree to strongly disagree.

Data Analysis
A 2 (Order: Earlier, Later) x 3 (CRT-2: Analytical, Intuitive, Other) Factorial Analysis of Variance (ANOVA) was used to predict PAS scores.

Results
We were unable to conclude that the order of receiving the CRT-2 influenced PAS scores, $F(1, 1103) = 0.02, p = .885, \eta^2_p < .01$. However, we found that the CRT-2 was related to PAS scores, $F(2, 1103) = 9.51, p < .001, \eta^2_p = .02$. We conducted a Tukey’s HSD test and found the Analytical group scored higher on the PAS scale ($M = 5.23, SD = 0.65$), than the Intuitive ($M = 5.08, SD = 0.63$) and Other ($M = 5.02, SD = 0.66$) groups,
with \( p < .05 \). We were unable to conclude that there was an interaction between the order and the CRT-2. PAS means are displayed in Figure 1.

![Figure 1. Bar Graph of PAS Scores by CRT-2 and Order](image)

**Discussion**

In this study, we aimed to identify a relationship between cognitive reflection and perception of psychology as a science. Results of the present study support our hypothesis that Analytical individuals would score higher on the PAS scale. We were unable to conclude that the order of receiving the CRT-2 influenced PAS scores. The finding of a significant correlation between scores on the CRT-2 and the PAS Scale suggests a relationship between individuals’ cognitive reflection capacities and their perceptions about psychology as a science — i.e., that the propensity to deliberate may play an important role in an individual’s attitudes toward psychology. If psychology is viewed as less scientific, it may be deemed less deserving of funding, as evidenced by psychology’s absence from some agencies’ lists of STEM disciplines (Price, 2011). Therefore, implications of these findings may include the recognition of the role cognitive reflection, specifically analytical reasoning, may play in decision-making, especially for concerns such as research funding and curriculum planning (e.g., implementing psychological research into teaching at all levels of education, including psychology courses earlier in education alongside other sciences). Furthermore, additional evidence of the relationship between analytical reasoning and perspectives of psychology as a science may support the potential for correcting detrimental misconceptions.

Statistical validity for the CRT-2 was good, shown by the \( p \) value being less than .001; however, the effect size was small. The CRT-2 has been...
shown to have high face validity, even though cognitive reflection was measured by only 3 questions (Thomson & Oppenheimer, 2016). The external validity was good, with a nationwide sample of over 25 community colleges, although all participants were students, which may limit the generalizability of the findings. In regard to internal validity, there are potential confounds, such as age, gender, more education (especially psychology courses), and socioeconomic status, as well as a potential threat due to variation in the location of individuals participating in the survey.

As with any study, there are limitations that must be addressed. One of the biggest limitations was that we had no control over the design of the research questionnaire, or the order of the measures presented in it. The CRT-2 always preceded the PAS Scale, while the CRT-2 and PB Scale order varied for participants. This may be a contributing factor to not finding a difference between participants who received the CRT-2 earlier or later. Similarly, the PAS Scale was not emphasized in the survey, as it was the last measure, which may lead to burnout and less attention to the questions. Another limitation was the format of the question concerning the number of psychology courses completed by each participant. The question was open-ended and may have been misunderstood by participants, making it difficult to code due to written answers (e.g., “Alot” [sic], “Currently completing,” “At least 10”) and to look for a relationship with measures such as the CRT-2 and PAS Scale. Additionally, no question assessed the participant’s level of education completed, so we were unable to evaluate this variable and the possible relationship with scores on the CRT-2 and PAS Scale. Furthermore, participation was limited due to supervision and computer lab requirements per the guidelines of the Psi Beta NRP, although not all participants adhered to these guidelines and there was no discernable difference between participants who completed the study in a lab setting and those who did not.

Taking into consideration the results of this study, a logical future direction for testing would be to construct a questionnaire with two versions, one order being the CRT-2 then the PAS Scale, and the other order being the PAS Scale then the CRT-2. This variation of measure order may better evaluate context effects. Ideally, the PB Scale would be removed to emphasize the PAS Scale and focus on the relationship between CRT-2 and PAS scores. To have more than three questions would allow for a more sensitive measure of analytical and intuitive response. The Cognitive Reflection Test (CRT; Frederick, 2005) may be used in conjunction with the CRT-2 to implement more questions that prompt Type 2 processing. To counter the limitation of being unable to evaluate the number of psychology courses an individual completed, the question should be modified to only allow quantitative responses. Future research could better address multicultural dimensions by (1) removing the requirement of completing the research questionnaire in a lab setting, (2) including a question addressing the participants’ level of education completed, and (3) integrating transmasculine and transfeminine gender identity responses, allowing for a broader, more diverse, and accurate sample.

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The Role of Sociodemographic Factors and Reflective/Critical Thinking in the Belief of Psychological Misconceptions Among Community College Students

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Abstract
Misinformation has become a pervasive issue in society. In relation to human behavior and cognitive processes, psychological myths can have detrimental effects by distorting our perceptions. This study employed correlational and regression analyses with 86 community college students in Southern California to examine the relationships between demographic factors, belief in psychological myths, as well as the relationship between belief strength on reflective and critical thinking measures. Correlational analyses revealed significant associations between belief in psychological myths and identification with various demographic factors. Findings suggest that certain demographic characteristics may be associated with stronger inclination to believe in psychological misconceptions. There was no relationship between our measure of critical thinking and endorsement of psychological myths. Results from this study suggest a number of implications for higher education. For example, educators can design curriculum to specifically address misconceptions, foster critical thinking, and promote accurate understanding of psychological phenomena. Providing opportunities for critical thinking in higher education may be beneficial in mitigating misinformation and cultivating accurate perceptions of human behavior. Findings from the current study highlight the importance of promoting critical thinking in educational contexts to combat the spread and perpetuation of myths and misinformation, ultimately leading to a more informed and discerning society.

Keywords: misconceptions, college students, cognition, psychological myths, demographics
Psychological misconceptions plague society. These beliefs typically contradict scientific evidence. Research examining psychological misconceptions regarding scientific advancement and unresolved issues defines psychological misconceptions as “claims about mental processes that are unsupported by high-quality psychological research” (Bensley & Lilienfield, 2017, p. 2). In order to further understand why individuals may subscribe to unsupported psychological misconceptions, the current study explored the relationship between sociodemographic factors and critical thinking skill measurements to discover any patterns or relationships.

Psychological misconceptions can be harmful, resulting in real-world consequences. For example, individuals who serve on a jury may believe that eyewitness testimony is an accurate way of identifying a suspect of a serious crime, and falsely accuse an innocent person. However, the reality is that memory constantly changes, and those changes are influenced by a variety of factors such as biases, unreliability, and assurance, which may be influenced by sociodemographic factors (Albright, 2017). In turn, these influences jeopardize the accuracy of memory. In knowing this, it must be acknowledged that encoding, storage, and retrieval memory processes often do not produce a truthful “permanent record, like photographs stored in a safe” and cannot be treated as an accessible tape recorder or video camera for accurate eyewitness testimonies (Albright, 2017, p. 4).

Regarding higher education, research has supported that a phenomenon known as the misinformation effect has also been a driving factor in how psychological myths or misconceptions are created and can produce consequences that carry over into higher education learning. The American Psychological Association Dictionary of Psychology defines the misinformation effect as an event in which an individual inaccurately remembers false information that is provided by a researcher, contrary to precisely recalling the accurate information that was previously presented (American Psychological Association, n.d.). In essence, retroactive information obtained after the fact can confuse a person’s thinking after the initial episode of information exchange. So, an individual’s recollection of anecdotal memories may develop into less accurate accounts because of ensuing details. This effect tends to create beliefs in psychological misconceptions which is also referred to as retroactive interference, the state in which new learning interferes and supersedes old learning, which disrupts the memory of what was initially learned (Mcleod, 2023). For example, if an individual is initially taught to hold in their anger and do breathing meditations to help reduce the anger, but is later taught that it is better to yell and break objects as a way to reduce anger, then because of retroactive interference, the individual may believe the psychological misconception that “it is better to express your anger than to hold it in” (Lilienfeld et al., 2010, p. 2).

Furthermore, Bensley and Lilienfield (2017) found that a large percentage of laypersons endorse psychological myths, and, surprisingly, medical, and mental healthcare professionals also endorse some of those same misconceptions. One study showed that “72% of laypersons believed people only use 10% of their brains, and remarkably 6% of neuroscientists” believed the same (Herculano-Houzel, 2002, as cited by Bensley & Lilienfield, 2017, p. 1). Other studies have also shown that lack of critical thinking skills may be related to psychological myth endorsement (Bensley et al., 2014). Despite existing research, few studies have examined relationships between demographic variables such as religiosity, race, socioeconomic status, and psychological misconceptions or myth endorsement. As a result, the current study aimed to explore the relationships between community college students’ endorsement of psychological misconceptions and confidence in their knowledge, while considering what roles cognitive and demographic factors have in recognizing these myths and misconceptions. It was hypothesized that there would be a strong, positive correlation between sociodemographic factors (such as age, race, religion, and
parent education level) and belief in psychological myths and degree of confidence in myth ratings. Investigators also hypothesized that there would be a strong, inverse correlation between reflective and critical thinking skill scores and level of belief in psychological myths.

**Method**

**Participants**

In total, 86 students from an urban community college in southern California agreed to participate in the study. All participants provided written consent upon being provided with an explanation of the study. The sample identified predominantly as women (55 women, 27 men, four non-binaries, one missing value) with a mean age of 27.4 years old. Participants were primarily psychology majors (61.2%) and the data collected represented a range of ethnic identities, including Hispanic/Latino (50.0%), White/European American (23.2%), Mixed Race (9.3%), Black/African American (8.1%), Asian American (3.5%), Middle Eastern/Indigenous (2.4%), and Other/Rather Not Say (3.5%). Socioeconomic status (SES) also varied across participants, with the majority (45.3%) identifying as working class, followed by middle class (38.4%), preferred not to respond (8.1%), other (4.7%), upper class (2.3%), and missing (1.2%). Through a religiosity importance measure, most participants also identified that religion was not at all important (48.8%) to them, followed by somewhat important (33.7%), then very important (17.4%).

**Materials**

Key variables in our study included sociodemographic factors (gender, age, SES, race/ethnicity, religiosity), background factors (college major, honors society membership, maternal and paternal education, completed psychology courses, stage in education when the scientific method was learned), myth sum score calculated by the total myths believed (higher scores indicating more myths endorsed), overall confidence in myth answers score (higher scores indicating more confidence), number of correct Cognitive Reflections Test (CRT) answers (higher scores indicating better performance), and religiosity score (higher scores indicating higher importance of religion).

All participants responded to a 76-item self-report questionnaire consisting of a two-part Psychological Myths Scale, a Psychology as a Science Scale, sociodemographic questions, as well as a CRT, which was randomly received across participants either prior to or after being presented with the Psychological Myths Scale. The CRT (Frederick, 2005) uses three text-based numerical problems to measure the cognitive ability or disposition of a participant to reflect on a question, rather than reporting the first intuitive response that comes to mind. Those who perform well on the CRT tend to perform well at numeracy tests, general ability tests, and tend to avoid biases in judgment and decision-making tasks (Campitelli & Gerrans, 2013). The internal reliability of the CRT is modest ($\alpha = 0.60 - 0.74$; Stieger & Reips, 2016). The Psychological Myths Scale includes 16 myth statements, each consisting of two parts that assessed the participant’s belief in the myth (measured as true/false/other) as well as their confidence of their answer about the myth, measured on a Likert scale from 1 (not very confident) to 7 (very confident). The confidence scale can indicate levels of accuracy in memory and recognition but is dependent on the question posed and analysis used (Tekin & Roediger, 2017).

**Procedure**

This study was approved first through the Irvine Valley College application to the Institutional Review Board (IRB), followed by IRB approval from the authors’ home institution. Participants were recruited through convenience sampling from the immediate population of the community college through email recruitment to psychology professors, printed flyers posted on campus, and word of mouth. Participants were provided with an informed consent form that estimated their time commitment, outlined the online survey format, and informed them that their participation was entirely voluntary and there was no penalty for
withdrawing from the study. Participants were informed that their responses would remain confidential, and that any identifying information would be removed once the data was analyzed. All participants were read an administration script that covered all protocols involved in their participation in this study. Each was also provided with a paper version of the informed consent, which they signed before continuing to the online form. All study documents were retained in a locked office on campus.

All participants were required to complete the study questionnaire in person at a campus computer lab with at least one proctor from the research team present to ensure validity of the data. Participants were not allowed to look up answers or multitask. Data was collected using an online survey format hosted on Google Forms. Participants self-reported their answers for a series of 76 items total. Participants had no prior knowledge of the content or design of the study, and proctors ensured that no information was communicated between participants at any stage of the administration.

There was an element of experimental manipulation in which a CRT was assigned on a randomized basis to participants. Randomization was done to produce an experimental group (exposed to CRT) and a control group (not exposed to the CRT before rating their beliefs in the myths). Would activating critical thinking serve to reduce participants’ scores on the myth belief measures? Randomization of the CRT was done with a sequence director based on each participant’s phone number (an arbitrary designator). Because the study involved presenting participants with psychological misconceptions and experimental manipulation, after they completed the questionnaire all participants were immediately debriefed by a member of the research team. The debriefing provided participants with accurate information regarding the myths as well as the study’s purpose.

Results

Correlation analyses assessed the relationship between key study variables. Myth Belief Score and CRT Scores were not significantly correlated. There was a weak yet significant, positive correlation between confidence score and religiosity score ($r = .318, p = .003$). Confidence score and age were also significantly weakly positively correlated ($r = .216, p = .046$). Religiosity score and age also approached statistical significance ($p = .061, r = .203$).

Analysis of variance (ANOVA) assessed the relationships between sociodemographic factors and Myth Belief Score. No significant results were found for a father’s educational level or academic major. However, there was a significant result for race ($F(5, 77) = 3.01, p = 0.015, 95\% CI = [-4.76, 5.923]$), with post hoc comparisons revealing the greatest differences between White/European-American ($n = 20$) and Black/African American ($n = 7$). ANOVA assessment of the relationship between SES and Confidence Score indicated significant differences between Middle Class ($n = 33$) and Upper Class ($n = 2$) participants ($F(4, 80) = 2.73, p = 0.035, 95\% CI = [-33.333, 40.358]$).

No statistically significant findings were found for ANOVAs of Scientific Method Learned and Myth Belief Score, father’s education level and confidence score, academic major and confidence score, race, and confidence score, Scientific Method Learned and Confidence Score, SES and Myth Belief Score, mother’s education level and Myth Belief Score, or mother’s education level and Confidence Score.

Discussion

This study was designed to explore the relationships between community college students’ endorsement of psychological misconceptions and confidence in their knowledge while considering what roles cognitive and demographic factors have in recognizing these myths and misconceptions. The most notable findings from the analyses conducted were isolated significant differences between Black/African American and White/European-American racial groups and myth belief, as well as between self-reported religiosity and confidence levels. Consistent with previous studies (e.g., Cavazos et al., 2020; Furnham & Hughes, 2014),
there were limited significant findings between traditional, non-refutational psychological education as measured by number of psychology courses completed and recognition of psychological myths and misconceptions (Cavazos et al., 2020). Although critical thinking skills are imperative for recognizing misinformation and overcoming popular myths, the CRT measurement had no significant effects on myth recognition when administered prior to the myth belief scale, consistent with previous research (e.g., Bensley & Lilienfeld, 2015).

Myth belief score differences between Black/African American and White/European-American participants, while notable, had limited practical significance due to limited participants per group, failing to meet a minimum participant percentage threshold. Religiosity level and confidence in myths were also significantly positively correlated, suggesting that those who value religion more have stronger confidence in their myth “knowledge.” Furthermore, higher religiosity scores among Black/African American and White/European-American participants could potentially account for differences in myth endorsement between these groups, as well as within racial and ethnic groups, as measured by both religiosity and confidence scores. Finally, confidence in myth beliefs and age were significantly positively correlated, suggesting that confidence in beliefs increases with age.

**Study Strengths, Limitations, and Implications**

It is important to note that this study relied on widely used instruments for measuring psychological myth belief and critical and reflective thinking for gathering data. Although the Psychological Myths and CRT scales have demonstrated reliability in previous research, there remain inherent challenges to measuring psychological misconceptions, particularly with forced-choice (true/false) measures. In their study testing psychological knowledge and investigating widely held misconceptions using a new test design, Bensley and Lilienfeld (2015) argued for the inclusion of a not sure/I don’t know response option for reducing guessing and chance in results. Similarly, more comprehensive psychological myth scales are available (Bensley & Lilienfeld, 2015; Lilienfeld et al., 2010) and could also be implemented with the addition of a third, not sure/I don’t know answer choice.

Furthermore, data collection included an assessment of participants’ beliefs regarding psychology as a science, which was not included in the current study analyses, which might have accounted for common sense attitudes toward common myths rather than applying greater critical thinking (Gaze, 2014). This is important to consider, as previous knowledge can affect new learning, particularly when an individual is more confident in their misbeliefs (Bensley & Lilienfeld, 2015). Given the lack of findings between CRT exposure and myth belief scores, developing critical thinking skills for reducing intuition-based reasoning will likely be an important direction for higher education interventions (Cavazos et al., 2020).

In the context of the study’s strengths and limitations, it is recommended that future research continue to empirically investigate widely held and potentially harmful psychological myth beliefs. For example, future research studies could implement both cross-sectional and longitudinal experimental designs for tracking myth belief and confidence over time, in addition to qualitative research for deepening understanding of how myths are encountered, accepted, and overcome after exposure to scientific knowledge. Future studies could also
continue investigating the relationship between religion, confidence, and psychology as a science in the context of demographics.

There are also implications and practical recommendations for instructional design in higher education. For example, qualitative research aimed at psychology instructional design for all majors (Cavazos et al., 2020) could help provide an empirical understanding of effective strategies to reduce exposure to and endorsement of misinformation. Practical strategies may include normalizing adaptive heuristics while applying corrective instructional design (Lilienfeld, 2010) and having instruction and correction prioritize highly consequential or harmful myths (Furnham & Hughes, 2014).

References


Quantifying the Pervasive: How Widely Held Are Psychological Misconceptions Among Undergraduate Students?

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Abstract
Psychological misconceptions are widely held ideas that contradict current psychological research (Bensley et al., 2020). Belief in such myths contributes to introductory psychology students’ overconfidence of their prior knowledge (Bensley et al., 2015), limiting student engagement and comprehension. The present study sought to identify the prevalence and extent of community college students’ belief in psychological misconceptions in hopes of guiding educational efforts to combat these notions. Students completed an online questionnaire in a proctored environment (most typically while seated in a computer lab or classroom having Wi-Fi available), in which they were presented 14 myths and asked to label them as true or false. After rating each myth, participants were prompted to rate their confidence in their previous answer. The three main hypotheses were 1) there would be a negative correlation between the number of college psychology courses students completed and their myth belief scores, 2) psychology majors would endorse fewer myths than non-psychology majors, and 3) students who believe psychology is a science would believe in fewer myths. The first two hypotheses were not supported. However, there was a significant correlation identified for the third hypothesis. The generalizability of these findings is limited by a disproportionate number of female participants and a lack of ethnic and age diversity. Future research should replicate this study with a more diverse pool of participants. These findings suggest that instructors design interventions to target myths in the psychology courses they teach.

Keywords: misconception, introductory psychology, myth endorsement

A psychological misconception is a widely held belief that contradicts the most recent psychological research. Even those with advanced degrees in psychology are vulnerable to supporting one or more psychological myths. Misconceptions abound in various fields of psychology, but particular branches that we would like to focus on are abnormal psychology, forensic psychology, and educational psychology.

In the realm of abnormal psychology, misconceptions can function as barriers to treatment. For instance, Basterfield et. al (2023) highlighted in their literature review that claims about the ineffectiveness of therapy and medication can deter people from seeking treatment and refilling...
prescriptions. They also noted that misconceptions about mental illness can perpetuate social stigmas, such as the myth that those with mental disorders are more dangerous than the general population. Moreover, a geropsychology study by Lopez et al. (2020) highlighted that graduate psychology students hold ageist misconceptions about older adults, such as the belief that older adults are not receptive to psychotherapy and the idea that it is too late to provide care for them. This is particularly harmful, as mental illness in the elderly is likely to go unnoticed as a result of their preexisting physical health problems, and agist biases among practitioners may further exacerbate the number of undiagnosed disorders among this population.

Psychological misconceptions are also problematic in the criminal justice system. Franklin (2022) spotlights the myth that police officers are more accurate eyewitnesses than civilians, as they are believed to possess a better memory and more reliable judgment. This notion is exceptionally flawed, as eyewitness testimony has been repeatedly discredited as unreliable and suggestible. Franklin (2022) also notes that officers may be at risk of misremembering the sources of information and when they learned specific details about a case, as they are often strained for time with investigations. This misconception can produce large errors, such as aspects of crimes remaining uninvestigated in favor of following the leads the officers claim to remember clearly. Placing overreliance in police officers’ testimonies may also lead to improper convictions and acquittals. More generally, a study by Shaw and Woodworth (2013) surveying 256 students in an introductory forensic psychology course found that the endorsement of psycho-legal misconceptions is positively correlated with tough-on-crime stances and punitive sentencing decisions. Although one should be wary of generalizing this finding since the participants fell within a similar age range and were all students from the University of Columbia, it raises an important point that misconceptions about crime held by the public may encourage or perpetuate stricter yet unwarranted policies.

Educational psychology is another branch of psychology impacted by misconceptions. One pervasive myth is that students have a predominant learning style, and that teaching to said learning style enhances learning. Newton (2015) noted that this myth is held by a majority of the teachers surveyed in various countries. This widely held belief is harmful, as it can limit student learning opportunities and potentially discourage students from subjects that they believe require a different learning style. Specifically, students may disengage from their classes if their learning style is not efficiently helping them learn the material.

The pervasive impact of misconceptions on various psychological fields leads to the discussion of two correlates to holding these misconceptions. The first variable is the strength of one’s critical thinking skills, though there is conflicting research on this subject. In their study of introductory psychology students, Kowalski and Taylor (2004) found that critical thinking skills are not correlated with students’ pre-existing belief in psychological misconceptions at the beginning of the semester. However, improving critical thinking skills successfully predicted change in these beliefs over the course of the semester. In contrast, Basterfield et al. (2023) found that introductory psychology students who believed in greater numbers of psychological myths also had weaker critical thinking skills. Basterfield et al. (2023) do not note at which point in the semester the survey was administered, so it is possible that an interaction effect occurred between the students’ critical thinking skills and the course material.

Another variable in question is whether the number of psychology courses taken affects one’s belief in these myths. Redifer and Jackola’s (2022) study on misconceptions about neuroscience found that even students who had taken eight or more psychology courses were susceptible to such myths. While there were some myths that this group endorsed less, there were others that they
endorsed more strongly. However, since this study exclusively focused on neuroscience, it is possible that the number of psychology courses taken is more impactful on dispelling myths in other branches of psychology.

Given the pervasiveness of such myths, we sought to investigate how widely held psychological misconceptions are among undergraduate students by administering an online questionnaire. There were three main hypotheses: there would be a negative correlation between the number of psychology courses taken and myth belief scores, psychology majors would endorse fewer myths than non-psychology majors, students who believe psychology is a science would believe in fewer myths.

**Method**

**Participants**

All participants were part of the annual Psi Beta National Research Study, which aggregated participants from various chapters of Psi Beta, a psychology honors society for community college students, into a single database. After cleaning the data, there were 974 participants recruited through participating Psi Beta chapters, with a mean age of 22 and a mode age of 18. The majority of participants fell between the ages of 18 to 30, with the age groups 18, 19, and 20 having the highest frequency of participants. Three hundred and thirty-two participants identified as male, 588 participants as female, and 42 participants identified as non-binary, transgender, or genderfluid. Most participants identified as middle class or working class, though many participants chose not to respond to this question or selected “other.” Finally, 41.5% of participants identified as White/European American, 26% identified as Hispanic/Latino, and 11.8% identified as Asian/Asian American.

**Materials**

The online questionnaire assessed the extent of students’ beliefs in psychological misconceptions and looked for correlations with such beliefs. Participants were exposed to 14 misconceptions drawn from Bensley and Lilienfield (2015), Furnham and Hughes (2014), and Gaze (2014), along with two distractor items. They were asked to identify whether they thought a particular statement was true or false and then rate their confidence in their previous answer on a 7-point Likert scale. Students also responded to the Psychology as Science Scale, a 20-item assessment that measured whether participants consider psychology a science, as chemistry is. For instance, participants were assessed on the importance of experimentation in psychology and whether the field deserves funding for research (Friedrich, 1996). Finally, students were asked to report how many college psychology courses they had completed, their major, gender, age, ethnicity, and other information such as their religiosity and whether they were members of an honors program.

Along with measuring the number of misconceptions participants believed in, a myth confidence scale was computed, which measured participants’ accuracy in judging the 14 myths. If participants correctly labeled a myth as false, they received a 1, which was then multiplied by how confident they felt in their answer on a 7-point Likert scale. If they labeled a myth as true, they received a 0. Their confidence in each accurate answer was then summed for all 14 misconceptions to form the myth confidence measure.

**Procedure**

Upon receiving IRB approval, the questionnaire was administered in-person to Irvine Valley College psychology students and students from other participating Psi Beta chapters. Participants were recruited through psychology courses and incentivized with extra credit to complete the questionnaire. The research questionnaire was administered during multiple sessions from November 9th, 2022, to January 15th, 2023. When signing up for the study, participants were able to select from several different days to complete the questionnaire in the designated lab room. The Irvine Valley College students were also asked to provide their name, student ID, student email, phone number, Discord user tag if applicable, the name of their professor, and the section ID of their course. Their contact
information was required so they could receive reminders about the session they selected, which they were informed about on the sign-up form. The section ID of their course was requested so that professors could more efficiently give extra credit to students in different sections who participated in the study. Participants completed the questionnaire on a computer in a controlled space to maintain participant focus and prevent participants from looking up answers to questions online. When participants arrived at the survey setting, they were checked in and emailed the questionnaire. Checking in students was necessary to ensure that they could receive extra credit for their participation, as the questionnaire itself did not ask for information such as student IDs or course information. Otherwise, participant data would remain confidential. Before the questionnaire began, each participant read and completed an informed consent statement. They were told that they have the right to skip questions, that they may withdraw from the experiment at any point, and that their confidentiality would be maintained. At the end of data collection, a debrief email was sent to each participant. The debriefing email described the purpose of the study, how psychological myths impact daily lives, and the list of myths the participants were exposed to, as well as explanations for why each misconception is inaccurate. Contact information for the principal investigator was included in case any participant had questions. Lastly, participants were provided with links to scholarly articles in case they were interested in learning more about the topic.

Results

There was no significant correlation between the number of psychology courses taken and the number of myths endorsed, $r(955) = -.01, p = .765$. There was also a positive correlation between the number of psychology courses taken and belief in psychology as a science, $r(955) = .085, p = .008$ and a negative correlation between membership in an honors society and myth endorsement $r(971) = -.101, p = .002$. There was no significant correlation between myth endorsement and age, or between confidence in myth belief and age.

Discussion

The first hypothesis, that there would be a negative correlation between the number of college psychology courses taken and myth endorsement, was not supported. The second hypothesis, that psychology majors would endorse fewer myths than students with different majors, was also not supported. However, the third hypothesis, that there would be a negative correlation between belief in psychology as a science and myth endorsement, was supported.

The absence of a significant correlation between higher-level education and low myth endorsement has been supported in past research. As noted by Newton (2015), teachers endorse the myth that matching one's teaching style to students' learning styles improves academic outcome. Given that teachers have more experience and education than undergraduate students, it was interesting to find that many supported such a myth. Although the present study surveyed a different population, these findings reveal that continued education alone cannot prevent belief in psychological myths. The weak correlation between psychology courses taken and myth endorsement aligns with the findings of Redifer and Jackola (2022). The present study focused on a larger general population of psychology students rather than teachers or students of specific subcategories of the psychology major.

The failure to find a significant negative correlation between the number of psychology courses taken and myth belief scores, or a significant difference between psychology majors and others in their myth endorsement, highlights that psychology students also struggle to identify myths.
Students may have learned these myths earlier in their education (Redifer & Jackola, 2022), which can explain why many accept such claims as factual. A solution would be to actively point out misconceptions in college psychology courses and refute them with scholarly articles and other credible media sources.

This negative correlation between belief in psychology as a science and myth endorsement is encouraging as it points to possible ways to counter the issues that belief in psychological myths can cause. In addition, because the $p$ value was so small, the likelihood that this result is a matter of chance is lower than 1%. Psychology curriculum often saves the teaching of significant results for statistics courses, despite how fundamental such knowledge is for determining the soundness and implications of psychological research. Accordingly, emphasis on the more technical and statistical nature of psychology, both in a classroom environment and even in media sources, may help to strengthen the belief that psychology is a science. Although no direct causal element was found in this study, if the correlation holds, this action could be helpful in reducing belief in these psychology myths.

Psychologists can also create methods for ensuring that educators, both in psychology and in other disciplines, stay informed. For instance, it is vital to collaborate with teacher certification programs to add current psychological research to teacher-training curriculum. Another possibility is to introduce psychologist-led nationwide K-12 teachers in-services that highlight the latest research and dispel educational myths. Finally, it would be helpful to create an APA committee to look for and refute psychological misinformation in current media and popular educational texts. Given the harmful effects of believing psychological myths, it is beneficial for educators to have increased accessibility to the latest research. Through the awareness of educators, students will avoid engaging in behaviors and ideas that hinder success and improved well-being (Redifer & Jackola, 2022).

For future research, a more diverse sample would provide greater insight on the factors that affect myth endorsement, given the study’s limited generalizability due to the lack of ethnic diversity, socioeconomic diversity, and the disproportionate number of female participants. Finally, we encourage future research to investigate the precise factors that characterize honors students and their lower myth endorsement. It is possible that honors students may have stronger critical thinking skills, as honors courses are often research-based.

References


Evidence that Attitudinal Self-Justification (not Self-Refutation) Enhances Intellectual Humility

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Abstract

Previous research has shown that the dispositional trait of intellectual humility (IH) predicts increased tolerance to opposing perspectives and beliefs. In the current study, we reasoned that the relationship might also work in the reverse direction, i.e., that critiquing one’s position on a contentious issue might enhance IH. To evaluate this hypothesis, we prompted participants to declare their position on a potentially divisive social issue (specifically, whether to allocate scarce medical resources to non-vaccinated COVID-19 patients) and then randomly assigned them to either contradict their position, justify their position, or engage in an unrelated writing exercise. Contrary to our hypothesis, we found that participants who justified their belief reported higher levels of IH than participants who contradicted it. In light of this unexpected and somewhat counterintuitive result, we argue that the intellectually humble mindset is fortified under conditions of minimal self-threat as opposed to threatening forms of self-examination.

Keywords: intellectual humility, self-justification, self-contradiction, self-threat

Intolerance among ideological opponents is a pervasive and seemingly worsening social problem (Gentzkow, 2016). Rather than remaining open to opposing views, people are generally predisposed to shun alternative perspectives (Taber & Lodge, 2006), preferring to insulate themselves from diverse points of view within the confines of social media echo chambers (Bakshy et al., 2015) or other epistemic bubbles that may reinforce faulty or extreme positions on social issues. Alternatively, a sincere and open-minded approach to resolving disagreements can limit groupthink and heighten feelings of interpersonal closeness between opposing parties (McCullough et al., 1998; Overall et al., 2010).

What decides which of these divergent outcomes will result from ideological conflict? We propose that possessing a keen awareness of one’s intellectual fallibility – a personality trait called intellectual humility – may play a key role in determining such outcomes.

Intellectual Humility

The individual difference variable of intellectual humility (IH) essentially refers to the extent to
which people acknowledge that their judgment may be imperfect (Leary et al., 2017). Another way to view IH is that it represents the mean between two epistemic extremes, specifically, between intellectual arrogance and intellectual timidity (Zagzebski, 1996, p. 138). In this sense, an intellectually humble person can eschew the immediate rejection of opposing viewpoints while simultaneously avoiding immediate acquiescence when facing intellectual disputes (Vorobej, 2011). Hence, IH consists of being able to reason using one’s own beliefs while concurrently remaining open to additional evidence.

Within the relatively brief time that IH has been the subject of empirical studies in the behavioral sciences, it has been shown to predict a number of desirable outcomes pertaining to the analysis and acceptance of opposing views, as well as the individuals holding those viewpoints. For example, studies have found that IH is positively linked to the variables of openness, curiosity, tolerance of ambiguity, and low dogmatism (Leary et al., 2017). Other studies have found that those high in IH were more accepting of varying beliefs (Koenig & Büssing, 2010), were less critical of those who changed their beliefs (Tomz & Van Houweling, 2016), and showed greater sensitivity to strong and weak reasoning (Updegraff et al., 2007).

Across these various studies, IH has been treated as a stable dispositional quality that was measured rather than manipulated. In the current study, we aim to extend this previous literature by examining whether IH can be temporarily enhanced through a self-refutation manipulation.

**Inducing Intellectual Humility**

In addition to its trait-like features, IH tends to fluctuate to some degree across situations (Zachry et al., 2018). In fact, several extant studies have tested various ways to bolster IH (Porter & Schumann, 2017; Porter et al., 2020; Koetke et al., 2022). In one experimental study (Porter & Schumann, 2017; Study 4), participants who were placed in a growth mindset condition exhibited significantly higher IH scores than those in a fixed mindset condition. Another similar study (Porter et al., 2020; Study 5) manipulated self-reported IH by encouraging participants to adopt a humble IH by in turn increased the amount of effort invested to achieve mastery of a novel subject. Finally, Koetke et al. (2020; Study 3) successfully increased IH using a fallibility salience manipulation.

In light of these various methods for inducing IH, we expected that a self-refutation manipulation was also a likely candidate to bolster IH. Self-refutation, as we define it here, refers to the act of arguing against one’s beliefs. We reasoned that it is easier to be intellectually certain when a person has not engaged in the process of challenging their views using this approach. On the other hand, self-refutation calls for consideration of the opposing view in a relatively autonomous fashion free from any obvious outside persuasive intent. Under these conditions, where the argument supporting the opposing view is self-generated, that view may seem more plausible than it otherwise would because it will be perceived as familiar and closely connected to the self. In this respect, we regard self-refutation as similar to the concept of self-persuasion (Aronson, 1999), in which people are placed in situations where they are prompted to persuade themselves to change their attitudes. We expected that in addition to potentially inducing attitude change, this process would ultimately result in heightened IH by making the precariousness and defeasibility of one’s original position more salient than it would otherwise be.

**The Current Study**

Therefore, in the current study, we experimentally tested whether the act of self-refutation enhances IH. Specifically, we hypothesized that participants who were prompted to critique their position on a contentious issue would exhibit higher levels of IH than those who were prompted to justify that position or engage in an unrelated writing exercise.
Method

Participants

The participants (N = 102) included students enrolled in introductory-level psychology courses at a southeastern college of moderate size. All participants received extra credit as an incentive for their participation in the study, which amounted to 3% of the total course grade. Complete datasets were obtained from 104 participants (28 males, 73 females, 1 non-binary) ranging in age from 18 to 56 (M = 24.83, SD = 9.09); however, two participants’ datasets were ultimately excluded for failure to follow the study procedure.

Measures & Procedure

All prospective participants were notified via email about the research project, and they were offered an opportunity to participate for extra credit. At the outset, all participants read a consent form describing the nature of the study and the instruments and measures included in the study protocol. Participants who chose to participate then digitally signed the form. Upon completing the form, participants clicked a second link that directed them to the online study, administered via Qualtrics online study software.

In the online study, participants were first prompted to create a random and anonymous 5-digit subject ID number and answer a few demographic questions, including their age and preferred gender identification. Next, all participants were shown a short prompt engaging the issue of allocating medical resources to COVID-19 patients. Specifically, the priority that vaccinated versus unvaccinated patients should potentially receive under conditions of scarcity. The prompt read as follows:

*When hospitals with limited resources (e.g., lack of ventilators, hospital beds, nursing staff) attempt to handle an overwhelming surge in COVID-19 patients and are forced to make life-or-death choices about which patients will ultimately survive, should administrators prioritize patients who are vaccinated against the virus over patients who have chosen to remain unvaccinated?*

Once participants read the prompt, they indicated their position on the issue using a binary yes/no questionnaire item. Participants were then randomly assigned to either the self-contradiction (SC), self-justification (SJ), or control condition. In the SC condition, participants were prompted to write their most convincing case opposing their previously expressed opinion. In the SJ condition, participants received similar instructions, except in this case, they were prompted to write their most convincing case justifying their previously expressed opinion. Finally, to establish a neutral baseline, participants in the control condition were asked to describe how they coped with the COVID-19 pandemic.

After participants completed the manipulation, they completed the Comprehensive Intellectual Humility Scale (CIHS; Krumrei-Mancuso & Rouse, 2016), a 22-item questionnaire that taps into self-reported differences in IH. Participants responded to the 22 items, which included questions such as “My ideas are usually better than other people’s ideas” and “I am open to revising my important beliefs in the face of new information,” on a 1 (strongly disagree) to 5 (strongly agree) scale. This scale comprises four subscales: independence of intellect and ego, openness to revising one’s viewpoint, respect for others’ viewpoints, and lack of intellectual overconfidence. The overall scale achieved adequate internal consistency reliability (α = .97).

On the final page of the study, participants clicked on a link that redirected them to a separate webpage where they entered their names and thereby received extra credit for their participation.

Results

In order to test our hypothesis, we conducted a series of two-sample t-tests comparing mean CIHS scores between the various experimental conditions. The result of the first t-test was that the mean CIHS score in the SC condition (M = 80.63; SD = 10.41) was significantly lower than the mean CIHS score in the SJ condition (M = 85.71; SD = 3.62; t(68) = -2.17; p < .05; d = .52). There was no
statistical significance for the remaining comparisons between the mean scores in the SJ condition \((M = 85.71; SD = 3.62)\) and control condition \((M = 82.84; SD = 9.16; t(65) = 1.33; p = .19; d = .33)\) or the SC condition \((M = 80.63; SD = 10.41)\) and the control condition \((M = 82.84; SD = 9.16; t(65) = -.96; p = .34; d = .23)\). See Figure 1 for a graphical depiction of these results.

We then conducted a second series of two-sample t-tests using the mean scores obtained for the various subscales of the CIHS: Independence of intellect and ego, openness to revising one’s viewpoint, respect for others’ viewpoints, and lack of intellectual overconfidence. Of these, statistical significance was found in the difference in the mean ‘Respect for Others’ Viewpoints score between the SC condition \((M = 24.94; SD = 3.40)\) and the SJ condition \((M = 26.57; SD = 2.73; t(68) = -2.21; p < .05; d = .53)\). No statistical significance was found in other comparisons.

**Figure 1. Mean Intellectual Humility Scores by Study Condition**

![Graph showing mean CIHS scores by study condition](image)

Note. SC Cond = self-contradiction condition; SJ Cond = self-justification condition; CIHS = comprehensive intellectual humility scale. Error bars represent standard errors.

**Discussion**

The current study provides evidence that IH can be altered by justifying or contradicting one’s view. We hypothesized that the act of self-contradiction would enhance intellectual humility while self-justification would serve to reduce it. We found instead that the mean CIHS score in the SC condition was lower than the mean CIHS score in the SJ condition, which directly repudiates our hypothesis. Our findings also ostensibly challenge the results of several previous studies (Porter & Schumann, 2017; Porter et al., 2020; Koetke et al., 2022), the findings of which generally point to the conclusion that IH can be enhanced by inducing
participants to consider the limits of their knowledge, which approximates the act of self-contradiction in our study.

One way to make sense of these unexpected findings is to consider the concept of self-threat and how people tend to respond to such threats. Earlier research has shown that when one’s beliefs are threatened, a defensive fight-or-flight response can be activated, which in turn elicits a rigid, close-minded thought process that serves to preserve the integrity of the self and one’s core beliefs (Thórisdóttir & Jost, 2011; Kross & Grossmann, 2012; Bogdanov et al., 2021). Thus, it is plausible that in the SC condition, a self-threat response mechanism may have been inadvertently triggered, resulting in greater defensiveness and, therefore, lower IH, as opposed to higher IH, as we initially hypothesized.

In a similar vein, the previously cited studies (Porter & Schumann, 2018; Porter et al., 2020; Koetke et al., 2022) may have successfully induced participants to re-consider their views without eliciting self-threat, which perhaps explains why these investigators were able to bolster IH via these means while we were not. This account is also consistent with the results of another recent study, which found that IH can be increased via a self-affirmation induction (Marie et al., 2022), a result that further bolsters the current interpretation of our findings because self-affirmation has been shown to alleviate feelings of self-threat (Steele, 1988; Sherman & Cohen, 2002; Sherman & Hartson, 2011). Collectively, this body of research points to the broad conclusion that IH is diminished under conditions of self-threat and enhanced when feelings of self-threat are reduced. The findings of the current study appear to further bolster that account.

Our study also suffered from a number of important limitations. First, our scenario, based around the COVID-19 pandemic, was unique and distinctive; thus, it remains unclear whether our findings would be obtained using other similarly distinctive scenarios or with less idiosyncratic scenarios. Second, there were no significant differences in IH between the control and experimental conditions, which limits the ability to conclude whether engaging in self-justification increased IH or whether engaging in self-contradiction lowered it. Finally, we only measured IH in the immediate aftermath of the manipulation, so it is unclear how long this effect might last.

Future research should address these limitations by using multiple scenarios to test whether the results we obtained are dependent on the unique characteristics of our stimuli, utilizing control scenarios that may be more neutral and thus less likely to elicit a response than the one we used while strengthening the overall manipulation by making the scenario(s) more engaging (appealing, pertinent, etc.), and finally by employing longitudinal designs that permit measurement of the dependent variable over longer time intervals.

Despite these limitations, the results of the current study serve to extend the current understanding of IH by elaborating upon an emerging perspective that the intellectually humble mindset is fortified under conditions of minimal self-threat as opposed to threatening forms of critical self-examination.

References


Does a Sleep Workshop Reduce Student Stress?

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Abstract
Increasing mental illness among college students continues to be a critical issue. College life is often a time of great transition, contributing to and exacerbating students' rising stress, anxiety, and other mental health struggles. Poor sleep habits may develop during college, and poor sleep quality can amplify stress. To explore how institutions might help students struggling with stress, we conducted this study to examine whether a sleep-focused workshop would reduce stress levels in students at a Pacific Northwest community college. We generated an online pre- and post-workshop survey consisting of the Beck Anxiety Inventory, the Perceived Stress Scale (PSS), and the Sleep Quality Scale, which was distributed to participants before and after a sleep workshop presented by the college’s psychology department. It was hypothesized that (1) poor sleep quality correlates to higher student stress levels, and (2) that the sleep workshop intervention would reduce stress levels. Sleep quality and stress were found to be moderately negatively correlated before the workshop, $r(57) = -.482$, $p < .001$, and after the workshop, $r(40) = -.500$, $p < .001$. Additionally, there was a statistically significant decrease in stress after the workshop ($M = 26.50$, $SD = 7.91$) compared to before the workshop ($M = 28.77$, $SD = 7.41$), $t(56) = 29.33$, $p < .001$. These results provide more insight into the utility of sleep workshops for students and whether they can help students manage stress and improve their sleep quality, potentially improving student mental health by lowering stress and improving quality of life and education overall.

Keywords: sleep quality, sleep workshop, perceived stress, college students, community college
Mental health is a significant issue among college students in the U.S. and other countries, with increasingly higher reported mental health struggles in recent years. While most research on this issue has focused on students attending 4-year institutions, 2-year college students also have been found to have as high or higher rates of mental health issues. Two-year college students in the age range 18-22 years old had higher rates of depression, anxiety, and suicidal ideation than their 4-year college/university counterparts (Lipson et al., 2021). It is important to note that many students attending community college come from marginalized backgrounds and, as such, are more likely to have mental health struggles and less likely to have access to mental health treatment. For 2-year institution students, financial issues were the most significant barrier to treatment access. Additionally, financial stress was a key influence on community college students’ mental health issues and academic performance (Lipson et al., 2021).

Notably, mental health is thought to have a close relationship with sleep (Becker et al., 2018; Hartmann & Prichard, 2018; Jackson et al., 2020; Lund et al., 2010; McCabe et al., 2018). Poor sleep is correlated with higher negative moods, including lack of enthusiasm, emotions such as anger, fatigue, tension, and higher rates of physical illness (Lund et al., 2010). Mental illnesses such as anxiety and depression are correlated to poor sleep quality (Becker et al., 2018). Perceived stress is one of the most influential factors related to the poor sleep quality of students; specifically, as stress increases, sleep quality decreases (Doolin et al., 2018; Lund et al., 2010). Notably, academic and emotional stress have been found to hinder students’ sleep the most (Lund et al., 2010).

High levels of poor sleep quality have been reported among college students. One study found that only 29.4% of students reported receiving eight or more hours of sleep a night, which is concerning as eight hours is the average amount of sleep needed for young adults (Lund et al., 2010). Another study found that only a third of students reported getting 7+ hours of sleep, and 62% were determined to be poor sleepers (Becker et al., 2018). Additionally, poor sleep quality negatively influences student academic performance, with lower GPAs and a higher likelihood of dropping a course correlated to poorer sleep quality (Al-Kandari et al., 2017; Hartmann & Prichard, 2018).

Prior studies have evaluated the benefits of sleep workshops; studies have found that workshops can significantly increase awareness of the importance of good sleep habits. While some workshops have failed to change student sleep practices significantly, students reported believing that they could improve their sleep quality after attending the workshops (McCabe et al., 2018). Another sleep program found mild improvements in students’ sleep duration and sleep habits, specifically among students who reported getting the least amount of sleep (Levenson et al., 2016).

The current study evaluated a sleep workshop that focused on bringing awareness of good sleep habits to students at a Pacific Northwest community college to combat poor student mental health. It was hypothesized that (1) poor sleep quality of community college students correlates to higher student stress levels. Additionally, because of the established connection between sleep and stress and the beneficial impacts of prior sleep workshops on students, it was hypothesized that (2) the intervention of a sleep workshop would decrease students’ stress levels.

Method

Participants

Participants in this study were students at a Pacific Northwest community college. A total of 40 participants completed the pre- and post-sleep workshop surveys. Twenty percent of participants were under 18 years old, 40% of participants were between the ages of 18-20 years old, 12.5% were between the ages of 21-24, 17.5% were 25-29, 5% were 30-39, and 5% were 40-49. It is important to note that some students were dually enrolled in college and high school, resulting in a few participants being under 18. However, the institution’s
Institutional Review Board (IRB) approved participation of dual enrolled students before data collection began. Forty-two-and one-half percent of participants were White, 32.5% were Asian, 7.5% were Black/African American, 5% were Hispanic/Latinx, 10% responded as another race/ethnicity, and 2.5% declined to answer. Women made up 66.67% of participants; men were 25.64% of students; and transgender, non-binary, and gender-queer participants made up 7.69% of participants. Twenty-two-and one-half percent of participants identified as part of the LGBTQIA+ community. Participants’ family income ranged from under $30,000/year to over $150,001 or more/year. Thirty percent of student participants reported having financial concerns.

Materials and Procedure

Participants were notified of a free sleep workshop on campus through flyers, other students, and professors. Students who chose to participate were sent an online survey developed through Qualtrics XM consisting of 21 items of the Beck Anxiety Inventory (Beck et al., 1998), ten items from the Perceived Stress Scale (PSS; Cohen et al., 1983), six items from the Sleep Quality Scale (SQS; Yi et al., 2006), and nine demographic questions. The questionnaire used a mixture of forced-choice questions for demographics, 4-point Likert-type scales ranging from not at all to severely for the Beck Anxiety Inventory, ranging from rarely to almost always for the SQS, and a 5-point Likert-type scale ranging from never to very often for the PSS. The survey was distributed to participants approximately two weeks before and after the sleep workshop, a workshop presented by the institution’s psychology department. The survey was emailed, and students completed it on their own time. Some students were given the incentive of extra class credit in exchange for participating in the study, though awarding of extra credit was at the discretion of individual faculty members. Notably, we conducted a pilot study prior to this study, and the results of the pilot were used to refine the procedure and protocol of the current study.

The current study, as well as the pilot study, were approved by the institution’s IRB, allowing the study to be conducted on campus. Before completing the research survey, students were informed of the study’s goals; the information to be collected; informed that their participation was entirely voluntary; and that all data collected would be anonymous. Participants were also informed that some questions might be sensitive and, as a safety measure, they were given links to the campus’s counseling center and the Counseling Center Chair so that they could contact those resources if they felt it necessary. All participants provided informed consent.

The sleep workshop was a single, one-hour session conducted over Zoom. To increase participation, participants were given the option of attending one of two workshop times. The workshop focused on informing students about the short-and long-term effects of sleep deprivation on the brain and body, as well as providing students with sleep tips on how to achieve better quality sleep.

Results

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) software. It was found that sleep quality and stress before the sleep workshop were negatively correlated, $r(57) = -.482$, $p < .001$. After the workshop, sleep quality and stress were also found to be negatively correlated, $r(40) = -.500$, $p < .001$. Notably, there was a statistically significant decrease in Perceived Stress Scale (PSS) scores from before ($M = 28.77$, $SD = 7.41$) to after ($M = 26.50$, $SD = 7.91$) the workshop, $t(56) = 29.33$, $p < .001$.

Although sleep quality had a minor increase, it was not statistically significant (see Figure 1).

Figure 1. Pre and Post Stress Level and Sleep Quality
Discussion

This study found that stress is negatively correlated with sleep quality, meaning that as stress levels decrease, sleep quality levels increase, and vice versa. These findings support the hypothesis (1) that community college students' poor sleep quality correlates to higher stress levels. Additionally, the results of this study also showed that student stress levels had a statistically significant decrease after the sleep workshop, supporting the hypothesis (2) that the intervention of a sleep workshop would decrease students’ stress levels. These results are consistent with previous sleep interventions, which have found such workshops and programs beneficial for students (Levenson et al., 2016; McCabe et al., 2018). However, this study differed in that it focused on alleviating stress through the sleep workshop intervention. In contrast, previous studies have focused more on improved sleep awareness and increased practice of good sleep habits, which was not specifically measured in this study.

While we collected information on the number of classes students were taking, we did not explore how academic performance might be impacted by stress at this institution, nor how a workshop might improve academic success among students. However, because there was a correlation between improved sleep quality and academic success, the connection to academic performance is something to explore in future studies (Al-Kandari et al., 2017; Hartmann & Prichard, 2018).

The results of this study indicate that a sleep-focused workshop can be beneficial for lowering students’ stress and but not for increasing students’ sleep quality. The lack of improved sleep quality could be due to several factors, mainly the workshop’s duration and the post-survey data collection timing. Since the workshop implemented was a one-time hour-long session with no other intervention elements, the duration of the intervention possibly was too short to effectively improve sleep quality. Likely, a longer-duration intervention with a more individualized focus on participants might be more effective, as seen in other studies (Levenson et al., 2016; McCabe et al., 2018). Additionally, the post-workshop survey was distributed to students around the time of midterm examinations, which could have influenced the amount of sleep students were getting and their stress levels. It is also important to note that due to the unequal sample sizes of the pre-survey (n=56) and the post-survey (n=40), there could be a greater risk of finding significant results when they are not actually significant (Type 1 error). Another limitation is that all measurements of stress and sleep quality were done through student self-report, meaning that the reliability of the results is largely based on student perception.

Regarding the generalizability of this study, it is important to note that the overall sample size was relatively small, with a total of 40 participants. Additionally, the majority of participants identified as women (67%) and were either White (43%) or Asian (33%). These factors all impact the diversity of this sample, which impacts the generalizability of these results to a broader population.

This study should be replicated to measure the impact of the sleep workshop on students’ levels of sleep health awareness and healthy sleep habits. The next iteration of this study should include more measures of students’ academic performance. The results could provide a clearer idea of how students on campus are doing academically, how this might correlate to general sleep health, and how sleep workshops might improve these factors. Additionally, a series of sleep-focused workshops given over a longer duration of time might increase students’ sleep quality more than a single-time workshop, and including more individualized feedback or other elements for workshop participants could help improve sleep quality (Levenson et al., 2016; McCabe et al., 2018).

This study brings more attention to the mental health of community college students. It explored how an intervention in the form of a sleep workshop could be beneficial for the student populations of 2-year institutions, especially as such
institutions often have more significant numbers of marginalized students who have limited access to mental health services and face other health disparities (Jackson et al., 2020; Lipson et al., 2021). This research contributes to what we know about sleep workshops and wellness workshops for students in general. It shows that these workshops have the potential to be an effective avenue to help students manage stress and, in the future, improve their sleep quality. These beneficial impacts could notably improve student mental health by reducing stress and anxiety and result in the improvement of students’ education, academic careers, and daily life.

References
Exercise and Health: Examination of the Relationship between Gym Attendance, Mental Health, and Perceptions of Body Image

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Abstract
The present study examined the relationship between frequency of gym attendance, workout length, happiness, and perceptions of self-esteem, appearance, and the benefits of exercise. A total of 85 participants (48 females, 37 males) completed eight self-report measures, including the Rosenberg Self-Esteem Scale (Rosenberg, 1989), the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999), the Appearance Anxiety Inventory (Veale et al., 2013), the Body Dysmorphic Disorder Questionnaire (Phillips, 2005), the Muscle Dysmorphic Disorder Inventory (Zeeck et al., 2018), the Exercise Benefits/Barriers scale (Sechrist et al., 1987), and two additional measures reporting weekly gym attendance and duration. Results showed that the frequency of weekly gym attendance and time spent in the gym had no relationship to Body Dysmorphic Disorder (BDD), Muscle Dysmorphia (MD), and appearance anxiety. Time spent in the gym had no relationship to BDD, MD, and appearance anxiety. However, both frequency of gym attendance and workout duration had a strong positive relationship to beneficial views of exercise and self-esteem. Lastly, happiness was found to have no relationship with the frequency of gym attendance but had a positive relationship with the amount of time spent at the gym. Overall, it was concluded that gym attendance in general helps to improve certain aspects of mental health, perhaps through creating a more positive self-perception and increased subjective happiness.

Keywords: mental health, self-esteem, appearance anxiety, gym, exercise

People may believe that exercising and going to the gym serves to promote positive health benefits for the exercising individual, whether it be an increase in physical strength, fat reduction, or an increase in muscle mass. Others may attend the gym to improve their mental and emotional stability. Studies confirm that any physical activity is better than none, as a sedentary lifestyle has been linked to poorer health outcomes with an increased risk of other health-related problems (Lathia et al., 2017). Therefore, endeavors to increase physical activity seems to be an important goal for maintaining and increasing physical and mental health.
Interestingly, there may be a curvilinear relationship between body image and health outcomes. One might imagine that efforts toward maintaining or achieving fitness are positive up to a point. It could be that some individuals may never be satisfied with their achievements and may develop a distorted sense of one’s ideal self.

Individuals who begin to experience problems involving their body image may develop Body Dysmorphic Disorder (BDD), classified under the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013) as a type of Obsessive-Compulsive disorder that involves the preoccupation with perceived flaws or defects within an individual’s physical appearance. Individuals with BDD often perform repetitive behaviors based around their physical appearance, including excessive grooming, checking the mirror often, and conduct harmful mental acts such as comparing themselves in appearance to other individuals in the face of appearance concerns (American Psychiatric Association, 2013). A specifier of BDD, known as Muscle Dysmorphia (MD), in which an individual is preoccupied with the notion that their body is either too small or insufficiently muscular, and experiences feelings of inadequacy involving their musculature or physique (American Psychiatric Association, 2013). One study found that individuals with three to five years of experience in bodybuilding were more likely to have MD compared to individuals with zero to two years of experience (Harris et al., 2019).

These results suggest that while goals to increase physical appearance and functioning may be important to one’s health, there may be a point at which these goals could turn to distortions in perceptions and can thus become harmful to one’s health and mental functioning.

While research cannot make definitive claims as to what causes BDD, research has shown strong correlates with this affliction. First, self-esteem may be a contributing factor as it has been used to diagnose the presence of BDD. Previous research has shown that individuals with low self-esteem are more likely to suffer from a more negative body image (Biby, 1998). Moreover, a meta-analysis of the relationship between BDD and self-esteem has shown consistent links between the two (i.e., those with more severe symptoms of BDD show severely lower self-esteem in general; Kuck et al., 2021). In addition to self-esteem, appearance anxiety is another symptom of those with BDD. Individuals who report high levels of appearance anxiety are also more likely to suffer from BDD (Jordan et al., 2022). Preoccupation and anxiety surrounding physical appearance seem to be inversely correlated to self-esteem, resulting in an increased risk of BDD manifestation (Corazza et al., 2019). Thus, while we do not know the causal links, self-esteem and appearance anxiety may be markers for identifying those with BDD and MD.

Happiness is defined as a general emotional state that can be characterized by positive feelings such as joy, satisfaction, fulfillment, and contentment (Sran et al., 2021). However, the amount of happiness gained from physical exercise is dependent on the type of exercise being conducted with different types of training affecting different networks within the brain (Sran et al., 2021). Research has shown that happier people tend to be more physically active compared to unhappier people (Lathia et al., 2017). Exercise and happiness may potentially coincide with each other and explain why people may choose to go to the gym, affecting the frequency of sessions and time spent while there.

It is theorized that the individual’s view of how beneficial exercise is compared to perceived barriers to exercising may affect their choice to exercise (Blake et al. 2017). Those who viewed exercise as less beneficial compared to the barriers preventing them from exercising were less likely to engage in exercising overall. (Blake et al. 2017). However, those with more favorable views of exercise report overall better physical and mental health (Gabal et al. 2020). It is assumed that those who view exercise as more favorable or beneficial will exercise or go to the gym more often.
than those who do not. We may also assume those who participate in exercising by going to the gym do so because they believe it benefits them in terms of improving their mental health.

The purpose of the present study was to examine the relationship between gym attendance, BDD, and MD. Two hypotheses were posed. First, it was expected that frequency of gym attendance and time spent per session would be positively correlated to BDD, MD, appearance anxiety, and exercise benefit view. Second, it was expected that gym attendance and time spent per session would be negatively correlated to self-esteem and personal happiness.

Method

Participants

Eighty-five students (48 female, 37 male) from a southern California community college participated in the study. The average age of participants was 21.9.

Measures

Frequency of Gym Attendance Weekly. Participants were asked how often they attended the gym weekly or every week. Participants recorded their responses by selecting the option that applied to them (1 = 1-2 days; 2 = 2-3 days; 3 = 3-4 days; 4 = 4-5 days; 5 = 5-6 days; 6 = 6-7 days; 7 = 7 days).

Time Spent in Gym. Participants were asked the length of time that they typically spent in the gym exercising. Participants recorded their responses by selecting the option that applied to them (1 = I do not attend the gym; 2 = 1 to 1 ½ hours; 3 = 1 ½ to 2 hours; 4 = 2 to 2 ½ hours; 5 = 2 ½ to 3 hours; 6 = 3 or more hours).

Self-Esteem. Self-esteem was measured by using the Rosenberg Self-Esteem Scale (Rosenberg, 1989). Participants recorded their ratings using a 7-point scale (1 = Strongly Disagree; 7 = Strongly Agree).

Happiness. Happiness was measured using the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999). Participants recorded their ratings using a 7-point scale (1 = not a very happy person, less happy, or not at all; 7 = a very happy person, or a great deal).

Appearance Anxiety. Participants’ anxiety regarding their appearance was measured utilizing the Appearance Anxiety Inventory (Veale et al., 2013) adapted to a 7-point scale (1 = Not at All; 7 = All the Time) modified with an additional two questions for a total of 12 items versus 10 from the original inventory.

Body Dysmorphic Disorder. The presence of BDD was measured using the Body Dysmorphic Disorder Questionnaire (Phillips, 2005). The BDDQ is an 11 item self-report measure with participants recording their responses to questions (No or Yes), with higher scores indicating higher levels of BDD.

Viewing Exercise as Beneficial. Participants’ view of the benefits of exercise was measured using twenty questions of the 43-item Exercise Benefits/Barriers scale (Sechrist et al., 1987). Participants recorded their ratings using a 7-point scale (1 = Strongly Disagree; 7 = Strongly Agree).

Muscle Dysmorphia. The presence of MD within participants was measured using the Muscle Dysmorphic Disorder Inventory (Zeeck et al., 2018). Participants recorded their ratings using a 7-point scale (1 = Strongly Disagree; 7 = Strongly Agree).

Procedure

Students from psychology courses were invited to participate in the present study for extra course credit. Participants accessed the survey through Sona Systems, an online tool that gives individual participation course credit while maintaining participants’ anonymity. Once the participants accessed the survey, they first read an informed consent page that described the purpose of the study, the voluntary nature of their participation, their right to privacy, contact information, and potential risks or benefits. Individuals who gave consent to participate completed the questionnaire and were then debriefed.
Results

Both sets of hypotheses were analyzed utilizing Spearman’s Correlation method. The first set of hypotheses were partially supported. There were no relationships found between frequency of gym attendance and BDD, \( r(84) = -.14, p = ns, MD \), \( r(84) = .04, p = ns, \) or appearance anxiety, \( r(84) = -.00, p = ns \). However, there was a strong positive relationship found between gym attendance and exercise benefit view, \( r(84) = .66, p < .001 \). Also, there were no relationships between time spent in the gym and BDD, \( r(84) = .10, p = ns, MD \), \( r(84) = .11, p = ns, \) or appearance anxiety, \( r(84) = -.01, p = ns \). However, there was a strong positive relationship between time spent in the gym and exercise benefit view; \( r(84) = .56, p < .001 \).

The second set of hypotheses was also partially supported. There was a moderate correlation between frequency of gym attendance and self-esteem, \( r(84) = .30, p < .01 \), but no relationship between frequency of gym attendance and happiness, \( r(84) = .18, p = ns \). Also, time spent in the gym was positively related to both self-esteem, \( r(84) = .24, p < .05 \), and happiness \( r(84) = .22, p < .05 \).

Discussion

The results of the present study are partially consistent with findings in the recent literature (American Psychiatric Association, 2013; Harris et al., 2019). The most striking findings were that the frequency of gym attendance and time spent in the gym were positively related to exercise benefit view, self-esteem and/or happiness. This supports findings from current literature (see Biby, 1998; Kuck et al., 2021). However, no relationships were found between the frequency of gym attendance and time spent in the gym with more severe conditions such as BDD, MD, or appearance anxiety.

The failure to find relationships between frequency of gym attendance, time spent in the gym, BDD, MD, and appearance anxiety may reflect the mindset of a healthier group of individuals. That is, students who score high on the exercise benefit scale have a higher appreciation and positive view of exercising. Thus, it could be assumed that individuals with a high frequency of gym attendance associate the gym with more positive feelings more often than that of negative feelings associated with BDD and MD. In a healthy group of individuals, frequency of gym attendance and time spent in the gym may be a means to a positive goal, such as pursuing physical and mental health goals. Perhaps to other individuals with a less healthy mindset (not participants included in the sample for this study), frequency of gym attendance and time spent in the gym may be a means to ward off preoccupations with flaws or defects in one’s appearance. This is highlighted by the finding that individuals who attend the gym more often tend to have higher self-esteem, and those who spend more time in the gym report greater self-esteem and are generally happier.

With these findings come multiple implications. One implication is that just because an individual spends extensive amounts of time in a gym does not mean that the individual has a higher likelihood of developing BDD, MD, or appearance anxiety. These individuals are more likely to be happier, have higher self-esteem, and are more likely to view exercise as beneficial as opposed to detrimental. It is also implied that individuals who hold a more positive view of the benefits of exercise are less likely to suffer from BDD and MD while having less appearance anxiety. This information can enhance the current-day treatment of individuals suffering from BDD and MD by reframing their mindset to view exercise as more beneficial in pursuing positive health instead of warding off perceived imperfections or defects.

Though the benefits of this research are clear, they are not without notable limitations. First, the fact that college students are only a small sample of the population—that is, while college students in this sample reported lower rates of BDD or MD, they are not representative of the general population. Thus, future research may benefit from testing these relationships in samples with a more diverse population. A second limitation concerns the self-report nature of the data collection. While students...
may correctly report their frequency of gym attendance and time spent during each session, they may be less likely to recognize in themselves their own symptoms relating to BDD, MD, low self-esteem, or appearance anxiety.

Overall, exercising in a gym seems to have some health benefits. Not only is one achieving better physical health with exercise, but it also appears that going to the gym provides mental health benefits (Gabal et al. 2020). It should be noted that this data provides no evidence for a relationship between gym attendance and time spent per session to both BDD and MD. However, there is evidence for a positive relationship between gym attendance and positive mental health factors, such as happiness and self-esteem being positively correlated to time spent per session. One could apply this knowledge to take the first steps towards bettering oneself physically and mentally through exercise and the gym without fear of developing symptoms of BDD and MD.

References
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Sleep and Experiences of Stress on College Campuses: Evaluating Effectiveness of a Sleep Wellness Workshop

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Abstract

Researchers suggest that college students experience especially elevated levels of stress and notoriously poor-quality sleep. To address this, many schools provide wellness workshops designed to increase awareness and educate students on topics such as healthy sleep habits, stress management tips, and ways to avoid burnout. While the aim of these workshops is to improve students' well-being, are they successful, and are students experiencing a measurable benefit from attending? This study assesses whether a sleep-focused wellness workshop improved students' sleep quality and reduced their perceived stress levels. To evaluate the effectiveness of these methods, we hosted a sleep-focused wellness workshop open to all registered students and measured pre- and post-workshop perceived stress, anxiety, and sleep quality. The online pre- and post-surveys contained forty-six questions, consisting of demographics, the Perceived Stress Scale, modified versions of Beck's Anxiety Inventory, and the Sleep Quality Scale. We hypothesized that students who learn about better sleep habits by attending the sleep-focused wellness workshop would experience a reduction in their perceived stress and anxiety along with better overall sleep quality two weeks after participating. We hoped that the methods being taught were effective and that students effectively incorporated what they learned into their daily lives. This study found that attending a wellness workshop reduced students' levels of perceived stress and anxiety but had no effect on sleep quality. These findings provide confirmation that student support initiatives are an effective way of helping students manage stress and anxiety in college, even when the intervention is limited to a one-hour virtual wellness workshop. Future research should assess if offering more robust interventions yields a greater positive effect on students' well-being.

Keywords: sleep, sleep quality, perceived stress, wellness.
environment. The most common obstacles students face are schedule creation, time management, homesickness, academic stress, and forming new social connections (Hako et al., 2023). Unsurprisingly, college students routinely display higher levels of psychological distress than most other groups, which manifests depression, anxiety, stress, and poor sleep quality (Ferrari et al., 2022; Saleh et al., 2017). These issues have only increased in recent years, with current estimates from the World Health Organization's mental health surveys predicting that 35% of full-time students meet the criterion for at least one mental health disorder (Auerbach et al., 2018). Recent research has found that, compared to adults and age-matched peers in the general population, college students are experiencing higher levels of psychological distress, commencing with the first two years at the university garnering the highest reported period of distress (Sharp & Theiler, 2018).

Of these health factors, stress and sleep quality appear to be highly correlated, with a bidirectional relationship where one factor exacerbates the other (Pascoe et al., 2020). Specifically, students report being unable to get good sleep due to being too stressed, or that their poor sleep quality increases their overall level of stress (Shanbhog & Jeevan, 2023). Both elevated levels of stress and poor sleep quality are associated with reduced academic performance (Alotaibi et al., 2020).

Fortunately, research shows that interventions aimed at improving students' sleep are effective, and improving sleep quality has a more significant positive impact on overall academic success than improving other problems typically faced by students (Kaubrys et al., 2021; Hartmann & Prichard, 2018). A lack of good sleep strongly contributes to increased psychological distress (Li, 2023); therefore, teaching students about better sleep habits may positively impact issues that initially appear unrelated to sleep quality. In addition, past studies have confirmed that, on average, most first-year college students have received little to no education about healthy sleep habits. However, students are keenly interested in improving their sleep quality (Hartmann & Prichard, 2018).

These studies bode well for universities and suggest that sleep-targeted learning and interventions may prove effective at combating student distress and improving overall well-being during the early stages of college. Colleges can do much to help their students by providing resources and education on how to improve sleep quality. This study aimed to assess if students can benefit from a wellness-style workshop by comparing before and after workshop self-reported scores of sleep quality and perceived stress. We hypothesized that learning about healthy sleep habits would (1) increase students' overall sleep quality and (2) lower their levels of perceived stress.

### Method

#### Participants

This study consisted of 40 participants with an age range of 18 to 49. Females composed 67% of the sample, and the majority (43%) were White and 33% Asian. The sample was drawn from a mid-size community college located in the Pacific Northwest. All currently enrolled students, including dual-enrolled high school students under the age of 18, were eligible to participate. Institutional Review Board (IRB) approval was obtained before recruiting participants, and the IRB gave special permission to allow dual-enrolled high school students under 18 to participate. These participants were not asked to give their exact age, only to indicate if they were under 18. Participants self-selected into the study by signing up to attend a sleep wellness workshop offered by the college's psychology department. Potential participants were notified of the workshop and study via emails, paper and digital flyers, and in-class announcements by faculty. Incentives were not offered for participating, but several psychology professors independently provided their students with extra course credit in exchange for attending the workshop and participating in the study.
**Materials**

The sleep wellness workshop was held virtually on Zoom and offered at two separate times to maximize attendance. The survey was created using the Qualtrics XM platform and distributed to participants via email when they signed up to attend the sleep workshop. Survey questions were taken from the Perceived Stress Scale (Cohen et al., 1983), Beck Anxiety Inventory (Beck et al., 1988), and Sleep Quality Scale (Yi et al., 2006) to assess participants' levels of stress, anxiety, and sleep quality over the last two weeks. Our survey questions utilized both four and five-point scales: Perceived Stress Scale 1 (Never) to 5 (Very Often), Anxiety Inventory 1 (Not at all) to 4 (Severely – it bothered me a lot), Sleep Quality Scale 1 (Rarely) to 4 (Almost always). The survey was comprised of forty-six questions, twenty-one anxiety questions, ten stress questions, six sleep quality questions, and nine demographic questions.

We conducted a pilot study (n=22) several months before to test survey questions and flow. The pilot study followed the same structure, with workshop attendees completing a survey of thirty-one questions before and after the sleep wellness workshop.

**Procedure**

The surveys were administered between January 20th and February 9th, 2023. Participants were asked to take the survey as a component of attending the sleep wellness workshop. Those who registered to participate in the workshop were sent a link to the pre-survey the week before and sent the post-survey using the same format two weeks after the event. Informed consent was obtained from all participants at the beginning of the pre- and post-surveys. Participants were shown a consent document in Qualtrics with the option to accept or decline. Only participants who selected "accept" were allowed to proceed with the survey. All participants were told that the survey aimed to assess their stress and anxiety levels and that it would take approximately ten minutes to complete. They received a link via email inviting them to take a Qualtrics survey using their phone or computer. We instructed participants to take the survey before attending the one-hour virtual Zoom workshop. Only those who completed the pre-survey and attended the entire sleep wellness workshop were invited to take the post-workshop survey. The workshop focused on educating students about healthy sleep and included tips and suggestions for improving their sleep habits and overall sleep quality. Suggestions included limiting screen time before bed, lowering the room's temperature, avoiding large meals before bed, and developing a routine around getting ready to sleep. Approximately two weeks after attending the workshop, we sent participants another email containing the link for the post-survey. The second survey asked the same questions as the first and took approximately the same amount of time to complete.

**Results**

We evaluated our hypotheses by computing correlations between pre-workshop sleep and stress scores and post-workshop sleep and stress scores. We then conducted t-tests on pre- and post-workshop stress, pre- and post-workshop anxiety, and pre- and post-workshop sleep scores. Pre-workshop: $r(57) = -0.48, p < .001$. Post-workshop: $r(40) = -0.50, p < .001$. When comparing pre- and post-scores of perceived stress, anxiety, and sleep quality, we found a statistically significant decrease in perceived stress and anxiety levels after attending the workshop. Stress scores before ($M = 28.77, SD = 7.41$) and after ($M = 26.50, SD = 7.91$) the workshop, $t(56) = 29.33, p < .001$, the effect size, measured by Cohen’s $d$, was $d = 0.30$, which indicates a small effect. Anxiety scores before ($M = 38.07, SD = 11.42$) and after ($M = 35.89, SD = 8.09$) the workshop, $t(55) = 24.94, p < .001$ were significantly decreased (see Figure 1), and the effect size, measured by Cohen’s $d$, was $d = 0.22$, which also indicates a small effect. Finally, there was no statistically significant difference in sleep quality scores after attending the workshop.
Discussion

The current study hypothesized that attending a sleep wellness workshop would improve participants' sleep quality and lower their levels of perceived stress. Similar to other studies (Pascoe et al., 2020), we found a moderate negative correlation between sleep quality and stress in pre- and post-workshop data. Our findings indicate that the 1-hour virtual sleep wellness workshop was ineffective at improving college students' overall sleep quality. However, learning about sleep and healthy sleep habits may be an effective way of reducing students' levels of perceived stress and anxiety. These findings contrast other research (Kaubrys et al., 2021; Hartmann & Prichard, 2018), which found that stress was only reduced when there was a measurable improvement in sleep quality and vice versa. These results may have inadvertently been impacted by external factors such as midterm examinations. Midterm exams took place within a few days of collecting post-workshop responses and may have contributed to the lack of statistical significance between pre- and post-sleep scores. Sleep scores showing no significant change may indicate our intervention is working, as students typically report reduced sleep quality during periods of stress such as exams, and we recorded no significant change in sleep quality in either direction. Since this sample was collected from a community college, both the method used for the sleep workshop and the main findings of this study may not be generalizable to other schools, especially traditional four-year institutions.

Additionally, the two-week window between the workshop and post-survey may have been an inadequate amount of time for students to incorporate the new information they learned into their routines. While these findings are interesting, it is essential to consider how both the sample and statistical analysis may have impacted the results. As highlighted above, our pre- and post-workshop samples had different numbers of participants (pre n = 57, while post n = 40). Although we aimed to maintain equal sample sizes between pre- and post-surveys, several participants unavoidably failed to attend the workshop or take the post-workshop survey. Different sample sizes increase the likelihood of type I errors (false positives) and can significantly reduce statistical power (Rusticus & Lovato, 2014), which may have affected these findings.

Given that college students are facing higher levels of psychological distress than other age-matched groups (Sharp & Theiler, 2018), workshops such as the one utilized in our study may offer colleges a relatively low-effort solution for improving students' well-being by lowering their levels of perceived stress and anxiety. Future research on this topic should assess if using a more robust intervention, in the form of multiple wellness workshops or activities that engage students with the subject over a more extended period, garners a more significant reduction in perceived stress and anxiety levels. Perhaps a more robust intervention implemented at a time when students are not inordinately stressed by external factors would produce greater improvement in sleep quality than we observed. Despite the lack of significant improvement in sleep quality scores, this study found that students are motivated to improve their sleep quality and learning about this topic produced marked reductions in their anxiety and perceived stress levels. Schools should view these findings as a call for more student support programs and confirmation that these efforts are an effective way to improve the well-being of their students.
Figure 1. Cumulative Stress and Anxiety Scores

<table>
<thead>
<tr>
<th>Mean of cumulative scores</th>
<th>Stress</th>
<th>Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-workshop</td>
<td>28.77</td>
<td>26.5</td>
</tr>
<tr>
<td>Post-workshop</td>
<td>38.07</td>
<td>35.89</td>
</tr>
</tbody>
</table>

Note: The bars represent average self-reported stress and anxiety scores for the pre- and post-workshop samples.

References


An Exploration of the Relationship Between Vaccine Knowledge and Vaccine Willingness

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Suggested bibliographic reference

Abstract
The ongoing COVID-19 pandemic has lasted nearly three years, costing millions of lives worldwide. However, increased availability of COVID-19 vaccines has provided an opportunity to increase survival rates. Willingness to receive a COVID-19 vaccine has seen fluctuations in the United States. Key pivotal shifts have been due to increasing accessibility of COVID-19 vaccines and public knowledge of how COVID-19 vaccines work, largely influenced by both the spread of information and misinformation. This study examined patterns between COVID-19 vaccine knowledge and willingness to receive a COVID-19 vaccine in southern California residents over 18. Responding to an online survey, participants (n = 77) reported demographic information (including vaccine status), rated their willingness to receive the vaccine based on social pressures and perceived safety. Participants also answered questions about their individual and perceived vaccine knowledge. Data were analyzed using Pearson’s $r$. In support of the hypotheses, participants with higher levels of vaccine knowledge and greater perceived threat of COVID-19 were more willing to receive a vaccine. However, perception of vaccine knowledge was not significantly correlated with vaccine willingness or actual vaccine knowledge. Our findings add further understanding of factors that influence willingness to receive the COVID-19 vaccine. The results can inform researchers, policy makers, and the general public, furthering progress toward sufficiently immunizing the American population against COVID-19.

Keywords: community college, COVID-19, vaccine knowledge, vaccine willingness, perceived vaccine knowledge

The ongoing COVID-19 pandemic has lasted nearly three years, and it has cost millions of lives worldwide, but an increased availability of COVID-19 vaccines has provided an opportunity to increase survival rates (World Health Organization, 2021). However, the willingness to receive a COVID-19 vaccine has seen fluctuations in the United States (Piltch-Loeb et al., 2022). Key pivotal shifts have been due to an increasing accessibility of COVID-19 vaccines and public
knowledge of how COVID-19 vaccines work, both of which are largely influenced by the spread of information and misinformation (Piltch-Loeb et al., 2022). It is important to understand factors that may relate to people’s willingness to receive a vaccine, especially in regard to the COVID-19 vaccine and its boosters. Such factors include vaccine knowledge, perceived threat of COVID-19, and confidence in one’s own knowledge. This research can help further the understanding of factors that influence willingness to receive the COVID-19 vaccine. In addition, this research can inform researchers, policy makers, and the general public, and thereby further progress in sufficiently immunizing the American population against COVID-19.

Various behaviors and social factors predict low vaccine willingness, or “vaccine hesitancy” as some studies refer to it. Different studies have identified predictors such as social trust, educational level, vaccine accessibility, and vaccine knowledge (Gerretsen et al., 2021; Okamoto et al., 2022; Piltch-Loeb et al., 2022; Roberts et al., 2022). Research on influenza has indicated that vaccine knowledge positively correlates with vaccine willingness (Muñoz-Miralles et al., 2022; Schmid et al., 2017). Similarly, recent studies on COVID-19 have also identified vaccine knowledge as a powerful predictor of vaccine willingness (Gerretsen et al., 2021; Okamoto et al., 2022; Piltch-Loeb et al., 2022; Roberts et al., 2022). Therefore, these studies suggest that vaccine willingness might be influenced largely by knowledge of vaccines.

The present study examined patterns between COVID-19 vaccine knowledge and willingness to receive a COVID-19 vaccine in a sample of Southern California residents. In addition, we measured the perceived threat of COVID-19, as well as perceived knowledge of vaccines in order to determine which factors are correlated with vaccine willingness. We hypothesized that our research survey would show a positive correlation between vaccine knowledge and vaccine willingness.

Method

Participants

The study consisted of 77 participants (14 males, 62 females, and 1 non-binary individual) in Orange County, California. The average age of participants was 32 (ages ranged from 18 to 67). This sample participants consisted of 13% Asian/Pacific Islander, 2.4% Black/African Origin, 16.9% Latinx/Hispanic, 5.2% Middle Eastern, 49.4% White/European Origin, and 13% mixed race. Just over 83% of participants were students, 5.2% were faculty, 1.3% were staff, and 10.4% were not affiliated with an institution. Participants were recruited through social media and through Saddleback College, San Diego State University, and California State University Fullerton. Participants accessed the survey through an electronic link.

Materials and Design

A Google Forms survey was created to conduct this study. We used a correlational study design in which the independent variable was vaccine knowledge, and the dependent variable was vaccine willingness. We defined vaccine knowledge as the knowledge about the COVID-19 vaccine and other vaccines. Moreover, we defined vaccine willingness as the willingness to receive a COVID-19 vaccine. We also measured the variables of perceived threat of COVID-19 and COVID-19 knowledge perception. The perceived threat of COVID-19 was defined as how much participants viewed the COVID-19 virus as a threat. Knowledge perception was defined as how much participants thought they knew about the COVID-19-19 virus and the COVID-19 vaccine. Our vaccine knowledge measure was based on COVID-19 and COVID-19 vaccine information from the Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2023). We created original measures for vaccine willingness, perceived threat of COVID-19, and knowledge perception.

The survey collected demographic information including age, ethnicity, gender, college (if applicable), academic status, and COVID-19
vaccine and booster status. Aside from demographic items, the survey included a total of 32 questions — 10 questions measured vaccine willingness, 7 questions measured perceived threat of COVID-19, and 15 questions measured vaccine knowledge. Questions measuring vaccine willingness and perceived threat of COVID-19 used a Likert scale of 1 to 7 (Strongly Disagree to Strongly Agree). The last question that was a part of the vaccine willingness section measured knowledge perception about COVID-19. For vaccine willingness, the lowest possible score was 7 and the highest possible score was 70. For perceived threat of COVID-19, the lowest possible score was 7 and the highest possible score was 49. Vaccine knowledge was measured through 11 true-or-false questions and 4 checkbox questions; the lowest possible score was 0 and the highest possible score was 15.

**Procedure**

Prior to collecting data, the researchers completed CITI IRB training and acquired IRB approval for the study. Additionally, we pilot tested the study to evaluate our measures’ efficacy and validity. Following the pilot, we recruited participants by distributing the survey to professors who shared the survey links with their students. We also distributed the research survey to Saddleback Community College’s Psi Beta and Psychology Club, and over social media.

Participants read and gave informed consent, provided demographics information, and completed the survey items. Finally, participants were given a debriefing.

**Results**

Using JASP for all statistical analyses. First we computed descriptive statistics on vaccine knowledge, vaccine willingness, covid knowledge perception, and perceived COVID-19 threat (See Table 1). Next, Pearson’s r correlations were computed between vaccine knowledge and vaccine willingness. There was a significant positive correlation between vaccine knowledge and vaccine willingness (see Figure 1). Participants with higher levels of vaccine knowledge had a higher willingness to receive a vaccine, \( r(75) = 0.67, p < 0.001 \). Participants with higher levels of vaccine knowledge perceived COVID-19 as a higher threat, \( r(75) = 0.46, p < 0.001 \). Participants with higher levels of vaccine willingness perceived COVID-19 as a higher threat, \( r(75) = 0.49, p < 0.001 \). There was not a significant correlation between vaccine willingness and COVID-19 knowledge perception, \( r(75) = 0.04, p = 0.727 \). There was not a significant correlation between vaccine knowledge and COVID-19 knowledge perception, \( r(75) = 0.05, p = 0.663 \). There was not a significant correlation between perceived COVID-19 threat and COVID-19 knowledge perception, \( r(75) = 0.09, p = 0.431 \).

**Discussion**

Results of this study supported our hypothesis that there would be a positive correlation between vaccine knowledge and vaccine willingness. We found a significant correlation between vaccine willingness and vaccine knowledge scores. In addition, we found a significant positive correlation between vaccine knowledge and perceived threat of COVID-19, as well as between vaccine willingness and perceived threat of COVID-19. However, we did not find significant correlations between knowledge perception and vaccine willingness, knowledge perception and vaccine knowledge, and knowledge perception and perceived threat of COVID-19.

The results of our study were consistent with previous findings regarding the positive correlation between vaccine knowledge and vaccine willingness (Muñoz-Miralles et al., 2022; Okamoto et al., 2022; Roberts et al., 2022). This suggests that knowledge of vaccines might be one of the strongest determining factors for people to get vaccinated. Moreover, the finding that perceived knowledge of vaccines was not correlated with vaccine knowledge indicates that one’s perceived knowledge of vaccines might not be a reliable determining factor for one’s actual vaccine knowledge. In our study, there were participants who rated themselves low on perceived vaccine knowledge but scored high on actual vaccine
knowledge, and vice-versa. Additionally, our finding that perceived vaccine knowledge also did not correlate with vaccine willingness or perceived threat of COVID-19 indicates that perceived vaccine knowledge might not be a reliable indicator or measure of these variables.

Table 1. Descriptive Statistics for the Various COVID Measures

<table>
<thead>
<tr>
<th></th>
<th>Vaccine Knowledge</th>
<th>Vaccine Willingness</th>
<th>Covid Knowledge Perception</th>
<th>Perceived COVID-19 Threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>77</td>
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<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Mean</td>
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<td>5.779</td>
<td>22.416</td>
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<tr>
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<td>9.485</td>
<td>1.344</td>
<td>8.721</td>
</tr>
<tr>
<td>Range</td>
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<td>5.000</td>
<td>38.000</td>
</tr>
<tr>
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<td>21.000</td>
<td>2.000</td>
<td>7.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>13.000</td>
<td>57.000</td>
<td>7.000</td>
<td>45.000</td>
</tr>
</tbody>
</table>

Figure 1. Scatterplot Depicting the Correlation between Vaccine Willingness and Vaccine Knowledge

However, this study had limitations, including a small sample size composed primarily of participants of White/European origin, females, vaccinated participants, and students. This suggests that the results lacked diversity and may only represent a specific part of the population. Additionally, our study was conducted entirely online, so, given the possibility of looking up vaccine information, the online format may have influenced the efficacy and consistency of our vaccine knowledge measure.

In order to expand on the results of this study and address its limitations, future research should be conducted that more carefully explores the relationships between our variables. We found that vaccine knowledge is strongly correlated with vaccine willingness. Logically, the next step should be to understand how vaccine knowledge affects vaccine willingness. Additionally, future research should focus on the variables of perceived threat of COVID-19 and knowledge perception to clarify their relation to vaccine knowledge and vaccine willingness. Moreover, future research should include more participants and greater participant diversity.
References


Improving Student Learning in Introductory Psychology Courses with Peer Mentors and Supplemental Instruction

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Abstract
Research suggests that the presence of peer mentors in Introductory Psychology classes can improve student performance by raising course completion rates, promoting achievement of student learning outcomes (SLOs), and elevating overall grades (Asgari & Carter, 2016). Accordingly, Psi Beta student researchers brought honors psychology students into Introductory Psychology classrooms to serve as peer mentors. These mentors delivered three online lessons through Zoom, which covered scientific reasoning, biopsychology, and antidepressant therapy. The present study evaluated the effectiveness of these peer-presented lessons through a 64-item post-presentation assessment pertaining to Introductory Psychology. A total of 73 undergraduate psychology students from Irvine Valley College completed the assessment, with a control group of 64 participants and a treatment group of 9 students who participated in the supplemental Zoom lessons for extra credit. It was hypothesized that students who completed the supplemental lessons would score higher on the assessment than students who did not complete the supplemental lessons. A subset of hypotheses was posed that the treatment group would score higher on three individual SLO’s compared to the control group. These SLO outcomes encompassed the following abilities: First, recall of various fundamental concepts presented in Introductory Psychology, second, the application of critical thinking to differentiate between psychological misconceptions and truth, and third, the ability to recognize different research designs, and formulate conclusions based on data. Results indicated no significant differences between the groups on the overall assessment nor the individual student learning outcomes. Limitations include group sizes, potential bias in the treatment group, and reduced impact of online learning compared to in-person instruction. Future research should compare the relative effectiveness of live in-person lesson delivery, live Zoom sessions, on-demand pre-recorded lectures. Results from this study can be used to further enhance psychology instruction and ensure that students comprehend course content while simultaneously providing growth opportunities for peer mentors.

Keywords: Peer-mentoring, community college, introductory psychology
Introductory psychology is a popular class often taken by students of all majors (Hard et al., 2019). Although many students are interested in the field of psychology, few are prepared to engage with their course content. First-year students often struggle to adjust to the new pace of college and may find the introductory course to be more challenging than they anticipate. It follows that these students are likely to lose focus with the class and the professor, resulting in low grades and class participation (Asgari & Carter, 2016).

Prior research indicates that peer mentoring can equip students with strategies to approach and learn new materials more effectively in the introductory course. For instance, a study by Asgari and Carter (2016) on introductory psychology students found that students who received peer mentoring had increased performance on exam grades compared to the first exam they completed without peer support, which especially benefited those who scored below the class average on the exam. Accordingly, peer mentors can be employed to help students implement more efficient study skills, and they may be selectively paired with students who receive low scores on an initial exam. Research has also shown that students who receive peer mentorship have better average grades and complete more courses successfully (Leidenfrost et al., 2014). Psychology students receiving peer mentorship at the University of Vienna for two years reported lower average grades, indicating higher academic performance based on the Austrian grading system. In addition, the mentee students passed more courses compared to non-mentees, reinforcing the notion that peer mentorship in psychology students is beneficial (Leidenfrost et al., 2014).

In addition, employed peer mentors tend to be closer in age to the students; A relatable, well-trained mentor can assist students with improving their academic performances, information retention, and application of knowledge both inside and outside of examinations (Pilot et al., 2021). Given that mentors are often closer to students in age, they can form close relationships with students and make mentees feel more comfortable in seeking help. This enhanced accessibility can facilitate both comprehension of the material and overall performance in the course. Research shows that with the integration of peer mentors, students gain enhanced/increased knowledge about the academic setting they are in and the resources available to them (Alonso et al., 2010). Peer mentors with more experience in the academic setting can offer guidance and insight into available resources for students, which facilitates their education.

Expanding on previous research, this study aimed to assess the impact of peer mentoring on students that receive supplemental instruction from peers compared to students that do not receive peer support in PSYC 1, the introductory psychology course. Our hypotheses explored three Student Learning Outcomes (SLOs): SLO 1—the ability to recall concepts from PSYC 1; SLO 2—the ability to apply critical thinking skills to distinguish between psychological misconceptions and truths backed by research; and SLO 3—the ability to understand research design and draw conclusions from data when presented with figures. Our hypotheses were: (1) students who have completed the supplemental lessons will score higher on a questionnaire pertaining to PSYC 1 than students who did not complete the supplemental lessons, (2) the treatment group would score higher on SLO 1 compared to the control group, (3) the treatment group would score higher on SLO 2 when compared to the control group, and (4) the treatment group would score higher on SLO 3 when compared to the control group.

Method

Participants

Seventy-three undergraduate psychology students from a community college in Southern California completed an assessment administered by two faculty mentors in the fall of 2021. The assessment was adapted from pre-developed assessments designed for the Introductory Psychology course (Solomen et al., 2019; Halonen et al.; 2020; Taylor & Kowalski, 2014; Stevens et al., 2016; Becker-
Blease et al., 2021). The control group included sixty-four participants recruited through Introductory Psychology courses and given course credit or extra credit as incentives. The control group participants were also recruited through the college’s psychology honor society communication platform, Psi Beta Discord, many of whom demonstrated prior experience with psychology coursework. These students were not given an incentive to complete the assessment, and their participation was completely voluntary. The treatment group consisted of nine Introductory Psychology students. The students were recruited through the random selection of half of the students enrolled in ten Introductory Psychology courses. Upon the instructors’ discretion, they were given the opportunity to participate in an online supplementary instruction program for extra credit.

Procedure

The IRB application was initially submitted in 2021 and received an approval letter categorizing this research as exempt.

Faculty members leading this project were in charge of the peer mentor selection. The peer mentors were selected from honor students who were a part of Psi Beta chapter and who had expressed an interest in participating in an applied research study. These students were provided with instruction materials, relevant background readings, and scripts they could utilize for delivering the online lessons. The peer-mentors were able to ask any questions from the faculty mentor during meetings to ensure a thorough understanding of the lesson. The lessons consisted of PowerPoint presentations and educational videos covering topics including research design, biopsychology, and therapy. Each module had a specific focus on scientific research in psychology and covered basic research aspects such as correlation versus causation, spurious correlations, statistical reasoning, experimental research, double-blind design, independent variables, dependent variables, confounds, and placebos.

The treatment group was randomly selected from various sections of Introductory Psychology by the faculty members, and the opportunity to participate was offered to equal-sized control and experimental groups. Students in the treatment group were given the opportunity to complete three online lessons delivered by peer mentors and, upon completion, complete an assessment. Upon reaching full completion, participants were offered extra credit. All participants were verified to be 18 or older and had to complete an informed consent notifying them of their rights as participants. Identifying information was collected only for the purpose of assigning extra credit and was promptly removed from the data file. Original data files were stored on one password-protected device that belongs to one of the faculty mentors on this project. Access to this information was restricted to the faculty mentor in charge, and all data was deleted upon project completion. Students were contacted via email by one of the lead faculty members, which included handouts needed for the lesson and the Zoom link. Throughout the lessons, professors were not in attendance, and the lessons were delivered solely by peer mentors. To allow for collaborative discussions, students were placed into breakout groups to work on handouts together. The peer mentors checked in with the students in the breakout room to clarify topics and answer questions. The students had the opportunity to share their answers to questions on the lesson handout with the group, and the peer-mentors could correct any incorrect responses and provide further explanation. Students who attended all three lessons in their entirety and completed the attendance form were asked to complete an online assessment.

Assessments and Measures

Upon completion of the three lessons, the treatment group was administered a 64-item questionnaire, which was also given to the control group. The first 30 items captured SLO 1, the ability to understand concepts from Introductory Psychology; these items were adapted from Solomen et al. (2019). This content extended from research methods to various facets of psychology, such as
memory and psychological disorders. The next 20 items encompassed SLO 2, the use of critical thinking skills learned in the course to distinguish psychological misconceptions from the knowledge that has been supported by research. These items were adapted from Halonen (2020), and Taylor and Kowalski (2014). An example of a myth statement is that “individuals commonly repress traumatic memories,” while one of the statements actually supported by research was “criminals rarely escape punishment by pleading insanity at the time of the crime.” The final 14 items assessed SLO 3, the students’ ability to identify the elements of a study and draw conclusions from data when presented with figures. These items were application questions that were selected from Stevens et al. (2016) and Becker-Blesee et al. (2021). Based on a given scenario, students were asked to identify the independent and dependent variables of the study, as well as select the most reasonable conclusion about the data from various answer choices. Accordingly, to determine whether the Zoom meeting lessons were beneficial to students, the assessment scores of the treatment group were compared to the control group.

**Results**

An independent samples T-test was conducted to test the hypothesis that students who completed the supplementary modules would score higher on a questionnaire on Introductory Psychology material than students in the control group. There was no significant difference found between the two groups in the overall assessment, $t(71) = -0.905, p = .369$. There was also no significant difference between the two groups for SLO 1, $t(71) = -1.559, p = .123$, no significant difference for SLO 2, $t(71) = -0.874, p = .385$, and no significant difference for SLO 3, $t(71) = -0.985, p = .328$.

When comparing non-significant mean differences, the experimental group scored higher on the overall assessment ($M = 25, SD = 12.49$) compared to the control group ($M = 21.438, SD = 10.868$). For SLO 1, the treatment group scored higher ($M = 13.333, SD = 7.263$) than the control group ($M = 9.953, SD = 5.924$). For SLO 2, the experimental group also had a higher average ($M = 7.889, SD = 3.983$) than the control group ($M = 6.734, SD = 3.674$). However, the treatment group received lower scores on SLO 3 ($M = 3.778, SD = 2.774$) than the control group ($M = 4.75, SD = 2.772$). Each mean reflects the average number of questions each group answered correctly. See Table 1 in the Appendix for a summary of all SLO means and standard deviations organized by treatment and control group.

**Discussion**

This study sought to investigate the effectiveness of peer mentorship for Introductory Psychology students through the implementation of online Zoom lessons presented by peer-mentors. This study’s hypotheses included the following: (1) students with access to the supplementary instructions would score higher in total on a questionnaire relating to Introductory Psychology compared to the students who did not receive the lessons, (2) the treatment group would score higher on SLO 1 questions, recalling concepts from Introductory Psychology compared to the control group, (3) the treatment group would score higher on SLO 2, using critical thinking skills facilitated by the Introductory Psychology course to distinguish between psychological myths and knowledge supported by research compared to the control group, and (4) the treatment group would score higher on SLO 3, identifying research design aspects and drawing conclusions based on provided data when compared to the control group. The results of the study did not support any of the four hypotheses.

The lack of significance in these findings indicates that online peer mentors may not be as helpful as we expected, or as effective as previous studies reported. According to Leidenfrost et al. (2014), there was a significant difference among students with peer mentors as compared to the ones without a peer mentor in the overall grade the students received after two years; the peer-mentees received lower average grades, demonstrating better performance. In addition, Pilot et al. (2021), found that
psychology students with peer mentors had higher grades than they did during a semester without peer mentor intervention. Together, these findings suggest that proactive interventions in the first semester of the first year can enhance important aspects of learning and increase success for undergraduate psychology students. Moreover, Leidenfrost et al. (2014) found significant results suggesting mentees passed more classes in a two-year period in comparison to non-mentees. However, contrary to research findings, our study did not find any significant differences between the treatment and control groups in the three SLOs.

Since we did not see a statistically significant difference in the treatment group scores in comparison to the control group, it could be that peer mentors in an online setting do not have as significant an impact on the improvement of SLO scores. We also believe that our study did not find significant differences due to the small size of our treatment group. Although there was no significant difference between the two groups, there is merit to the finding that the treatment group had higher means for the overall assessment, as well as SLO 1 and SLO 2. This suggests that the modules potentially aided students’ retention of psychological content and overall reasoning. The lower mean for SLO 3, research design, may have been due to survey fatigue. This SLO was the last set of questions and was also the most application based, so it may have been better to include these questions earlier in the assessment.

Limitations

A prominent limitation of this study is that the group sizes were disproportionate, with the control group being far larger than the treatment group. Although the group means provide some insight about lesson effectiveness, the effectiveness of the Zoom lessons is questionable. Another notable limitation is that many of the participants in the treatment group who completed all three lessons may be highly driven students who already have good study habits, which may explain the higher means. Moreover, students whose cameras were turned off during the sessions might not have paid attention to the lectures and completed the handouts. Additionally, the students were not required to turn in completed handouts for credit, which may have contributed to the insignificant differences between the treatment and the control groups. A final limitation to be considered is that remote learning may not have as strong an impact as in-person lessons due to its limited social engagement. In an online setting, students do not receive the same personal and intimate instruction that they typically would receive in person, and they have fewer opportunities to build relationships with mentors, which could restrict their learning.

**Future Research**

To extend current findings, the differences between live and pre-recorded lessons should be examined by comparing alternative treatment groups consisting of a) live Zoom sessions, b) on-demand, pre-recorded lessons, and c) in-person lessons. Since this study does not account for the participant’s initial level of psychological literacy, we suggest administering a pre-test to assess whether the lessons produced measurable improvements in their understanding. In a similar vein, we would like to give pre- and post-questionnaires to the student mentors to compare their confidence in their knowledge and their psychological literacy before and after their work as peer-mentors. Lastly, the delivery method, materials, and content administered in the lessons should continue to be refined through student participant feedback. When replicating this peer mentor model, the online assessment assigned after the completion of the three lessons should include a final section to receive feedback for improvements. Through constant modification and strive for improvement, peer mentors may grow their understanding of differing lesson delivery, and student success rates may increase.
References


Appendix

Table 1

*Group Means for Overall Assessment and Student Learning Outcomes (SLOs)*

<table>
<thead>
<tr>
<th>Measures</th>
<th>Treatment Group</th>
<th>Control Group</th>
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<tr>
<td></td>
<td><em>M</em></td>
<td><em>SD</em></td>
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<tr>
<td>Overall Assessment</td>
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<td>Student Learning Outcome 1</td>
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<tr>
<td>Student Learning Outcome 2</td>
<td>7.89</td>
<td>3.98</td>
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<tr>
<td>Student Learning Outcome 3</td>
<td>3.78</td>
<td>2.77</td>
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</table>

*Note. N = 73, n = 9 for the Treatment Group and n = 64 for the Control Group.*
Honor Students Serve as Peer-Teachers to Implement the Introductory Psychology Initiative

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Suggested bibliographic reference

Abstract

Our department has developed a unique way to support APA’s Introductory Psychology Initiative (IPI) (Rudmann et al., 2022). Advanced students, all Psi Beta honor students, train and deliver supplemental instruction to introductory psychology students. Supplemental instruction includes lessons covering evidence-based study skills and applications of basic scientific concepts to topics of interest to students. The scientific concepts align with material presented in most introductory psychology courses (Becker-Blease et al., 2021; Stevens et al., 2016). Several forms of instructional delivery are used: In class presentations, live presentations via Zoom, or on-demand interactive web presentations using the PlayPosit platform. A comprehensive assessment plan gauges the supplemental instruction’s impact on student outcomes: Course SLOs, a pre- and post-presentation assessment battery, and longitudinal tracking of the academic progress of the introductory psychology students. In addition, our Psi Beta student presenters benefit from participating in a combined service and research project. Preliminary results indicate improved learning, but more comprehensive evaluation research is planned to overcome limitations of the current study.

Keywords: supplemental instruction, introductory psychology, peer-teachers

In recent years, the American Psychological Association (APA) has dedicated time and resources to improve and standardize introductory psychology education in the United States. In a project known as the Introductory Psychology Initiative (IPI), a team of psychology instructors met in Washington D.C. with the intention of improving introductory psychology instruction.

As a course, introductory psychology is one of the most popular classes taken by undergraduate students in their first year of college. According to the APA (2023a), approximately 1.4 million students take this course each year, often as a required element of either discipline-specific or general education coursework. In spite of the popularity of this course, instructors are often overwhelmed, feeling pressured to cover excessive amounts of content in their single-semester courses. To rectify this, the APA team sought to create integrative themes, offer teacher training and development, create a comprehensive set of learning outcomes (SLOs), and offer recommendations to improve student success.

Because of this team’s efforts, the introductory psychology course content was divided into five pillars. These five pillars are further divided into key topics. Instructors are advised to cover at least two topics per pillar, with pillars and topics
detailed below in Figure 1. As this figure shows, psychological research is the foundation for the five pillars and their corresponding topics. By organizing the themes in this manner, it was theorized that instructors will feel less pressure to cover the expansive content of this topic in their courses (Guring & Neufeld, 2022).

After reviewing APA’s IPI work, we sought to apply several IPI recommendations to improve the introductory psychology course at Irvine Valley College (IVC). To do so, a longitudinal study was designed to evaluate the benefits to students of adding supplemental instruction to introductory psychology.

Institutional data from IVC’s Office of Research, Planning, and Accreditation was obtained to determine which subsets of students would most benefit from changes to the introduction to psychology course. Longitudinal data reviewing multiple cohorts of first-year college students revealed a troubling phenomenon – first-generation, minority, and low-income students at IVC are less likely to successfully complete introductory psychology. To rectify this, the authors implemented an IVC specific subset of the IPI project.

Previous research offers multiple explanations and suggestions to improve course performance and completion rates for these students. First-generation college students are likely to face barriers that their counterparts do not and are consequently less likely to successfully complete a college degree (Petty, 2014). These barriers are numerous and limit these students’ ability to succeed. Specifically, first-generation students may be unprepared for college, working with limited academic abilities, lack of social preparation, and lower self-esteem (Aheron, 2014; Mehta et al., 2011; Hicks 2002; Hicks 2003). Additionally, first-generation students are more likely to be low-income and work full-time jobs while in school, often working to help support their families (Cho et al., 2008; Terenzini et al., 1996). Often, these students balance work, school, and familial commitments, and may struggle with guilt for pursuing academics if their family and peers do not understand the benefits of a college education (Payne, 2006). Because these students do not have access to the same resources as their counterparts, research suggests the need to provide first-generation students with additional scaffolding and academic support when beginning college (Petty, 2014). In other words, first-generation students will benefit from academic support beyond what is offered in a traditional classroom. In addition to these barriers experienced by first-generation students, many are also underrepresented racial minorities (URMs), adding an additional layer of complexity to the struggles they face (Goldman et al., 2020).

URMs specifically experience barriers to their education, prompting the need for equity-based practices in admissions, financial aid, and

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**Figure 1.** The Five Pillars of Introductory Psychology (APA, 2023a)

<table>
<thead>
<tr>
<th>PILLAR 1</th>
<th>PILLAR 2</th>
<th>PILLAR 3</th>
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**RESEARCH METHODS**
academic supports (Cuellar & Gándara, 2021; Ben-simon & Bishop, 2012). Bailey and Morest (2006) identified three elements that make up equity in higher education: (1) college preparation, (2) access to college, (3) success in reaching goals. For students who are already in a community college classroom, the area of focus is to ensure they are able to achieve their goals. Although there are a number of methods for improving equity for these students, the present study focuses on longitudinal success. Research suggests that for URMs, GPA is predictive of long-term success (Mooring & Moor-ing, 2016), indicating the importance of offering URMs academic support. Looking back at the needs of first-generation and URM students at IVC specifically, this literature suggests that offering additional academic support may be beneficial and lead to student success in the form of academic momentum (Wang, 2017), intellectual development (Pike & Kuh, 2005), and academic self-efficacy (Ramos-Sanchez & Nichols, 2008).

Academic support can take many forms, including supplemental instruction. Supplemental instruction is based on three goals, (1) improving student course performance, (2) improving course retention, and (3) improving graduation rates (Arendale, 2001). Current literature across multiple disciplines suggests that supplemental instruction is beneficial, as students with lower GPAs are more likely to stay in school after attending a supplemental instruction session (Skoglund et al., 2018). Furthermore, supplemental instruction delivered by peer mentors rather than faculty leads to additional benefits (Collier, 2017).

First among these benefits is role-modeling provided by peer mentors to their mentees (Collier & Morgan, 2008). First-year students must learn their new roles as college students, understand instructor expectations and develop academic skills. Peer mentors have already developed this understanding and skills and can serve as a resource to the mentees who may be struggling to achieve this. Additionally, peer mentors possess credibility, having succeeded in the same courses while often remaining more approachable than faculty (Collier, 2017). It follows that the presence of peer mentors in introductory psychology courses can improve outcomes for first-year college students (Asgari & Carter, 2016).

In addition to the benefits for mentees, mentors also experience benefits. Peer mentors further develop their own content knowledge, better understand their peers’ experiences, improve interpersonal skills, and reach higher levels of engagement with both their peers and faculty members (Riser et al., 2020). In other words, both the peer mentors and the mentees experience benefits as a result of their involvement in supplemental instruction.

Considering these potential benefits for both the mentors and mentees, implementing supplemental instruction with peer mentors was expected to improve course outcomes for introductory psychology students at Irvine Valley College. Peer mentors were trained to deliver curriculum, assist with coursework, and help promote equity in the classroom. Following the delivery of supplemental instruction, students were expected to be able to describe evidence-based study skills and basic research concepts and procedures used in psychology, as well as acknowledge that psychology is a scientific discipline that makes a positive contribution to society.

**Method**

To achieve these goals, honors psychology students were recruited and trained to deliver supplemental instruction. These peer mentors were recruited through the college’s Psi Beta honors society chapter. The volunteers attended Zoom trainings, discussed supplemental content with faculty, and completed background readings. The benefits and skills associated with acting as a peer mentor are especially noteworthy for these students, many of whom intend to pursue graduate education, teaching careers, and other academic pursuits.

Supplemental instruction content was divided into a set of lessons. The lessons cover research-based academic success tips, personality, memory,
development, biopsychology, therapy, sensation and perception, and health and wellness (Stevens et al., 2016; Becker-Blease et al., 2021). Introductory psychology instructors were given autonomy in how they encouraged student participation in the IPI project, with most faculty members opting to offer extra credit in exchange for completing both the supplemental instruction lessons and the subsequent SLO assessment. Faculty further supported this project by sharing class time with peer mentors, encouraging students to attend the supplemental instruction sessions, and sharing feedback provided by their students.

Following the COVID-19 pandemic, most introductory psychology classes at our college were offered entirely online. As a result, supplemental content was also offered online. In Fall 2022, peer mentors provided supplemental instruction via synchronous Zoom meetings. In Spring of 2023, this procedure was modified to instead use PlayPosit, an instructional software that integrates pre-recorded videos, slides, and quiz questions. Videos in PlayPosit were pre-recorded by peer mentors, with videos programmed to pause and require students to answer questions or provide reflections before continuing. This delivery method allowed students to complete modules independently and asynchronously, on their own schedule outside of class time. Additionally, by pre-recording these lessons, instructors were given the option of scheduling lessons in order to match their course content.

To evaluate the effectiveness of this intervention, a number of strategies were implemented. These strategies include qualitative evaluation through surveys and discussions with peer mentors and mentees, scores on lesson quizzes, end-of-term outcome assessments, overall course performance, and longitudinal completion outcomes as reported by the college’s Office of Research, Planning and Accreditation. The primary outcome assessment was comprised of 15 items, divided into two sections. The first section (the SLO assessment) measured students’ understanding of course content and scientific reasoning abilities, while the second section (the psychology as a science (PAS) assessment) measured students’ belief that psychology is a science (Stevens et al., 2016; Friedrich, 1996).

Cohorts

This project was implemented across three cohorts: Fall 2022, Spring 2023, and Summer 2023. In Fall and Spring, introductory psychology students were offered extra credit for participating, but may have seen participation as extra workload and declined. This may have resulted in small sample sizes unrepresentative of the population. Students who did participate completed the outcome assessment at the end of the semester. In Summer 2023, the supplemental instruction modules were integrated as a required element of an introductory psychology course offered to advanced high school students through the college’s dual enrollment program. Because these students did not have prior experience in college courses, integrating supplemental instruction with peer mentors was expected to provide students with academic support and improve learning outcomes. Additionally, in this course, students completed the outcome assessment both as a pre- and post-test allowing us to assess change over time following completion of both the course and the supplemental instruction lessons.

Participants

Participants in the Summer 2023 cohort were high school students taking introductory psychology as their first college class. This cohort was comprised of 63 students, all of whom were below the age of 18. There was a total of 20 males and 42 females in the sample, and a majority of students (82.5%) were not employed and were taking only one college course (71.4%), with an average GPA of 3.38.

Results

Looking at project data from each cohort, both the Fall 2022 and Spring 2023 cohorts did not have an accurate comparison group due to the small sample sizes. Additionally, these students did not complete a pre-assessment, limiting the utility of the data. However, in Summer 2023, because the
supplemental instruction modules and pre and post-tests were a course requirement, a total of 63 students participated. Data from eight participants was removed via listwise deletion due to incomplete assessments, leaving a final $N$ of 55.

Results indicated a significant difference between SLO and PAS results between pre and post-test. Specifically, paired samples t-tests indicated that SLO scores were significantly higher at post-test ($M = .66$) than at pre-test ($M = .58$), $t(54) = -2.50, p = .02, d = -0.34$. Similarly, PAS scores were significantly higher at post-test ($M = 4.28$) than at pre-test ($M = 4.03$), $t(54) = -6.23, p < .001, d = -0.84$. Finally, there was a significant positive correlation between PlayPosit scores and final course grades $r(61) = .820, p < .001$.

Looking at qualitative data collected in both Fall and Spring, students reported high agreement that participating in supplemental instruction modules with peer mentors was beneficial and should be continued (see Figure 2).

**Figure 2.** Percent Agreement of Benefits to Participation

Additionally, students were given opportunities to share their feedback about the content of these supplemental instruction lessons. Students requested better alignment between lesson materials and course content, but overall were highly satisfied with the supplemental instruction. One student shared that:

“The peer-teacher lessons kind of made the course feel like a classroom again in a sense. Maybe it is because the course I am enrolled in currently is online, but it felt nice going through the lessons rather than just opening the books.”

**Discussion**

Although this project is still very new, early results suggest that participating in peer-mentor led supplemental instruction can benefit students. Paired samples t-tests indicated a significant change in SLO and PAS scores between pre and post-tests. In other words, after completing the introductory psychology course and supplemental lessons, students had a deeper understanding of psychology and were more likely to believe psychology is a science. Additionally, the significant positive correlation between PlayPosit scores and overall course grades suggests that better performance on the PlayPosit assignments is predictive
of better performance in the class overall. However, it is important to note that this relationship is not causal, and it cannot be assumed that PlayPosit performance contributed to overall class performance. It is equally possible that high-achieving students happened to do well on both metrics.

Further research is needed to elucidate these relationships as well as to infer causality and integrate student feedback. A more comprehensive and systematic research plan will help us determine the most effective mode of instructional delivery. It seems likely that peer-taught lessons presented in the traditional face-to-face classroom will have greater impact than the online alternatives. Stevens et al., (2016) and Becker-Blease et al., (2021) reported successful outcomes for lessons presented by instructors in traditional classroom settings. The student’s comments that end the Results section of this paper suggest that the online environment is not ideal for delivering peer-taught lessons; future instruction may best be implemented as face-to-face delivery. This feedback can be integrated in future semesters, ensuring continuous quality improvement in the intervention.

Limitations were present in this study. First, students may not have given their best effort in completing assessment questions, especially in pretests. Additionally, there are likely differences in individual students’ pre-existing knowledge. Finally, because this supplemental instruction was conducted in an asynchronous online environment, there may be differences in student performance if compared to face-to-face instruction. Future research can seek to rectify these limitations, expanding the generalizability of findings and create resources that can be used by introductory psychology instructors at other colleges.

The results of this study support the notion that peer mentors in introductory psychology courses can improve outcomes for first-year college students (Asgari & Carter, 2016). Further research is needed to assess the positive impact of this project on the peer-instructors themselves (Colvin & Ashman, 2010). Participating Psi Beta students gain experience in organizing and presenting supplemental instruction and researching the impact of their efforts. It is likely that many of the learning outcomes for peer-instructors align with outcomes presented in the APA’s Guidelines (APA, 2023b) for undergraduate psychology majors.

Finally, we intend to share resources developed for this IPI project. Resources will include lesson materials such as lesson guides for peer-presenters, PowerPoints, group discussion worksheets, and participant handouts. Most of these resources were adapted from Becker-Blease et al., (2021). Resources from this on-going research project will become available for download from the Psi Beta Research Website during the 2023-2024 academic year.

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