

The Impact of Persuasion Techniques on Student Performance and Mental Health in
University Setting

by

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ABSTRACT

Thirty percent of engineering students suffer from extremely severe stress, which is associated with poor academic performance, decreased motivation, and poor mental health. As a result, new, effective techniques must be developed to improve student outcomes. A potential technique that could be valuable in the classroom is persuasion techniques. There are six primary persuasion techniques: reciprocity, liking, social proof, scarcity, commitment, and authority (coercive and expert). Persuasion has been studied exhaustively with respect to altering behavior (e.g., sales, compliance), but has only briefly been studied in education. Studies show that positive student-teacher relationships can improve grades, positive peer relationships can improve mental health, and coercive power can increase stress. No studies have examined all persuasion techniques with respect to student outcomes, and this study aims to fill that gap. The objective of this study is to evaluate the use of persuasion techniques in the classroom to improve mental health and enhance academic outcomes.

I hypothesized that methods that enhance community and improve sense of belonging (reciprocity, commitment, liking, social proof) will lead to better academic and mental health outcomes, and methods associated with negative professor attitudes (coercive authority) will lead to poor academic and mental health outcomes. To evaluate these hypotheses, a sample of 336 university students were surveyed to see which persuasion techniques they perceived their professors to use and examine the effects of these on academic outcomes (grades, attendance, assignments) and mental health outcomes (engagement, positive impact, stress, well-being, executive function).

The data partially supports the hypotheses, with various student academic and mental health outcomes significantly improving with higher use of liking, social proof, commitment, and expert authority, and worsening with higher use of coercive authority. In conclusion, by teaching professors to use liking, social proof, expert authority, and commitment in their classrooms while decreasing coercive techniques, professors can effectively improve student grades and mental health.

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INTRODUCTION

Studies show that 30% of engineering students suffer from “extremely severe stress”¹ inhibiting academic performance. High levels of stress are directly correlated with poor quality of life, lower well-being, difficulty in paying attention, lower grades², and decreased motivation³. In addition, psychological stress (e.g., lack of faculty support, hostile environment, lack of sense of belonging, and sense of isolation) is the primary reason students report leaving engineering⁴. Hundreds of studies show that stress inhibits the prefrontal cortex essential in executive functions⁵. Executive functions are a cognitive process that facilitate concentration, task planning, memory, emotional control, and more⁶. Executive functions are critical for effective cognitive learning⁷. Chronic stress alters pathways that optimize executive function and can cause or worsen symptoms of executive dysfunction⁸. Stress directly impairs academic performance and learning, and additional studies show that acute and chronic stress are strong risk factors for mental health issues⁹.

Engineering students have poor mental health and sense of belonging leading to poor academic performance and attrition. Studies show that engineers are twice as likely

¹ Jensen and Cross, “Engineering Stress Culture.”

² Pascoe, Hetrick, and Parker, “The Impact of Stress on Students in Secondary School and Higher Education.”

³ Pascoe, Hetrick, and Parker.

⁴ Kuley, Maw, and Fonstad, “Engineering Student Retention and Attrition Literature Review.”

⁵ Girotti et al., “Prefrontal Cortex Executive Processes Affected by Stress in Health and Disease.”

⁶ Girotti et al.

⁷ Bull and Scerif, “Executive Functioning as a Predictor of Children’s Mathematics Ability.”

⁸ Girotti et al., “Prefrontal Cortex Executive Processes Affected by Stress in Health and Disease.”

⁹ Girotti et al.

to suffer from mental health challenges compared to other university students¹⁰. Poor mental health in students is associated with lower academic achievement^{11, 12}.

Additionally, engineering students stated that the primary reason they wanted to leave engineering was due to mental health struggles¹³ and lack of a sense of belonging¹⁴.

Engineering students have an intense focus on grades, and often experience “imposter syndrome” in which they feel as though they are not capable of being an engineer, and therefore do not belong¹⁵. Women and minorities are underrepresented in engineering furthering the lack of sense of belonging, attributing to their disproportionately high rates of leaving¹⁶. Mental health and lack of sense of belonging are necessary to address to help students succeed in engineering, especially as the complexity of challenges students face increases.

Modern students face increased stress and decreased attention spans, which is a symptom of poor executive function and as a result can inhibit academic performance. Due to the COVID-19 pandemic, 89.4% of students report increased stress and 54.5% report decreased attention spans¹⁷. With the rise of technology, students are becoming more distracted and inattentive during class, and the average student has difficulty sitting down and studying for more than 15 minutes at a time, leading to worsening outcomes¹⁸.

¹⁰ Danowitz and Beddoes, “Characterizing Mental Health and Wellness in Students across Engineering Disciplines.”

¹¹ Cornaglia, Crivellaro, and McNally, “Mental Health and Education Decisions.”

¹² Brännlund, Strandh, and Nilsson, “Mental-Health and Educational Achievement.”

¹³ Andrews, Clark, and Phull, “Attrition, Mental Health and Student Support in Engineering Education.”

¹⁴ Marra et al., “Leaving Engineering.”

¹⁵ Jensen and Cross, “Engineering Stress Culture.”

¹⁶ Geisinger and Raman, “Why They Leave: Understanding Student Attrition from Engineering Majors.”

¹⁷ Quintiliani et al., “Resilience and Psychological Impact on Italian University Students during COVID-19 Pandemic. Distance Learning and Health.”

¹⁸ Rosen, “The Distracted Student Mind — Enhancing Its Focus and Attention.”

Interventions are necessary in order to improve student stress, academic performance, mental health, and engagement.

One technique that may be beneficial in improving student outcomes is the use of psychological “principles of persuasion” by addressing student stress and mental health. There are six primary persuasion techniques: reciprocity, scarcity, authority, commitment and consistency, liking, and social proof (see Table 1).

Table 1: The Six Primary Persuasion Techniques

| Persuasion Technique | Definition |
|----------------------------|--|
| Reciprocity | People desire to return favors done for them |
| Scarcity | People find something more desirable if they believe there is a limited amount of it |
| Authority | People are more easily persuaded by someone who they perceive as authoritative or an expert |
| Commitment and Consistency | People are more likely to do something if they commit to it first (privately or publicly) |
| Liking | People are more easily persuaded by people they like |
| Social Proof | Humans are inherently social creatures with a desire to fit in, so they are more easily persuaded by the group |

Sources: Cialdini, “The Science of Persuasion.”¹⁹, Cialdini and Goldstein, “The Science and Practice of Persuasion.”²⁰, Young, “The neurobiology of Human Social Behaviour.”²¹

These techniques are used to establish relationships (reciprocity, liking), increase motivation (scarcity, commitment), and manage decisions during uncertainty (social proof, authority) in order to gain influence over someone. Authority can also be divided

¹⁹ Cialdini, “The Science of Persuasion.”

²⁰ Cialdini and Goldstein, “The Science and Practice of Persuasion.”

²¹ Young, “The Neurobiology of Human Social Behaviour.”

into two subcategories: coercive authority and expert authority. Coercive authority represents authority obtained through the use of rules and punishments (e.g., parents, law enforcement), while expert authority represents authority obtained based on the perception of having expertise or special knowledge (e.g., lawyers, doctors)²².

Research shows that persuasion techniques reduce stress and improve sense of belonging and mental health, and as a result may be effective in improving engineering students' academic performance. Establishing relationships (reciprocity, liking) has been found to improve sense of belonging²³ and improves a student's ability to manage academic stress leading to better academic satisfaction²⁴. One study examined motivational based interventions (scarcity, commitment) and found that when doctors increased patient motivation and collaborated with them rather than using authoritative or coercive techniques, they were able to more effectively improve patient mental health²⁵. One study showed that helping patients manage decisions during uncertainty (social proof, authority), allowed them to be involved in the decision making while reducing their stress²⁶. Persuasion techniques have been found to decrease stress and improve mental health and sense of belonging, so it may be effective in improving outcomes in engineering students.

Persuasion has been studied exhaustively with respect to altering intrinsic motivation and behavior (e.g., sales, voting, compliance)²⁷ but has only been briefly

²² French Jr. and Raven, "The Bases of Social Power."

²³ Miller, Williams, and Silberstein, "Found My Place."

²⁴ Baqutayan, "Stress and Social Support."

²⁵ Butterworth et al., "Effect of Motivational Interviewing-Based Health Coaching on Employees' Physical and Mental Status."

²⁶ O'Connor et al., "Decision Aids for Patients Facing Health Treatment or Screening Decisions."

²⁷ Cialdini and Goldstein, "The Science and Practice of Persuasion."

evaluated in education. Although no studies directly examine persuasion in education, many studies have examined methods that can be categorized under specific persuasion techniques.

Reciprocity involves the use of gift giving to induce reciprocal actions. In education, the gift a teacher gives is knowledge²⁸. Although there are no studies that examine the direct interaction between this gift giving and student outcomes, studies show that experiential gifts are more effective than material gifts in fostering a positive relationship²⁹, and because the gift of knowledge is primarily experiential, it may be effective in strengthening student-teacher relationships.

Liking can be studied in education through the lens of student-teacher relationships, which have been shown to improve academic success and mental health. It was found that students who had a positive relationship with their teacher had improved academic success, sense of belonging, and well-being³⁰. According to student feedback, teachers who established a positive relationship with their students tended to be more effective, whereas teachers who dehumanized students evoked feelings of disengagement and dissatisfaction³¹. Apart from impacting well-being and academic performance, positive teacher attitudes (e.g., compassion, friendliness) have also been found to improve students' personalities and life performances³².

²⁸ Martínez-Alemán, "The Nature of the Gift."

²⁹ Chan and Mogilner, "Experiential Gifts Foster Stronger Social Relationships Than Material Gifts."

³⁰ Giota and Gustafsson, "Perceived Academic Demands, Peer and Teacher Relationships, Stress, Anxiety and Mental Health."

³¹ Mihalas et al., "Cultivating Caring Relationships Between Teachers and Secondary Students With Emotional and Behavioral Disorders."

³² Ulug, Ozden, and Eryilmaz, "The Effects of Teachers' Attitudes on Students' Personality and Performance."

Commitment and consistency enhances academic performance and increases on-task classroom behavior. The Pygmalion Effect describes the phenomenon in which teacher expectations influence student outcomes. Teachers who held positive expectations for students' intellectual development led to students with improved academic performance, whereas students without this positive expectation didn't perform as well³³. Students' performance stayed consistent with the expectations placed on them. Additionally, it was found that public goal setting significantly increased on-task behaviors in the classroom, while private goal setting did not³⁴.

Social proof promotes student-student relationships, leading to improved mental health. Studies show that positive student-student relationships had a positive impact on well-being and mental health, while peer rejection or loneliness was associated with poor academic performance, increased stress, and poor mental health³⁵.

Expert authority has been shown to enhance academic performance and learning. Studies show that students who learn from expert teachers have more integrated, coherent, and enhanced understanding than other students³⁶. Expert power has also been shown to enhance student cognitive and affective learning³⁷.

Finally, coercive authority has been shown to worsen student mental health, stress, and learning through the use of rules and punishments in the classroom. One study

³³ Rosenthal and Jacobson, "Pygmalion in the Classroom."

³⁴ Lyman, "The Effect of Private and Public Goal Setting on Classroom On-Task Behavior of Emotionally Disturbed Children."

³⁵ Giota and Gustafsson, "Perceived Academic Demands, Peer and Teacher Relationships, Stress, Anxiety and Mental Health"; Richardson, Elliott, and Roberts, "Relationship between Loneliness and Mental Health in Students."

³⁶ Berliner, "Learning about and Learning from Expert Teachers"; Richmond and James McCroskey, "Power in the Classroom II: Power and Learning."

³⁷ Richmond and James McCroskey, "Power in the Classroom II: Power and Learning."

showed that coercive power led to decreased student satisfaction, learning, and teacher influence, as well as increased stress³⁸. It also damaged students' psychological wellbeing and sense of belonging³⁹. Another study found that use of coercive authority led to worse affective learning and cognitive learning, leading to poor grades⁴⁰.

Although there are studies that examine individual persuasion techniques, no study directly evaluates all six persuasion techniques in education, and their impact on stress, mental health, and academic performance. Here, I will fill this gap by examining the relationship between college students' perception of their professor's use of persuasion techniques and the students' stress, mental health, and academic outcomes.

The objective of my study is to evaluate the use of persuasion techniques in the classroom to improve mental health and enhance academic outcomes. I hypothesize that increased student perception of professors' use of methods that focus on enhancing community, relationship building, and sense of belonging (reciprocity, liking, commitment, social proof) will lead to better academic and mental health outcomes because previous studies have shown that improving students' environment and relationships will lead to decreased stress thereby improving executive function, and therefore improving outcomes in the classroom. I also hypothesize that increased student perception of professors' use of methods associated with negative professor attitudes (coercive authority) will be associated with poor academic and mental health outcomes because coercive power has been found to worsen student grades and wellbeing. If my

³⁸ Jamieson and Thomas, "Power and Conflict in the Student-Teacher Relationship"; Sava, "Causes and Effects of Teacher Conflict-Inducing Attitudes towards Pupils."

³⁹ Jamieson and Thomas, "Power and Conflict in the Student-Teacher Relationship"; Sava, "Causes and Effects of Teacher Conflict-Inducing Attitudes towards Pupils."

⁴⁰ Richmond and James McCroskey, "Power in the Classroom II: Power and Learning."

hypotheses are correct, it will mean that persuasion techniques effectively improve students' academic performance and mental health and can be utilized in university classrooms to decrease stress and improve the engineering learning experience.

METHODS

Subjects

Current engineering students participated in this study, accounting for 336 total responses (Table 2). Eligibility criteria were: 1) University students 18 and older, 2) active students at Arizona State University, and 3) engineering majors. Subjects were recruited through online posts, posters around campus, and recruitment in classrooms. Students participating in the study were given the opportunity to participate in a drawing to receive one of sixteen \$50 gift cards. This study was conducted under ASU IRB approval for STUDY00015569. Consent was obtained from each participant before beginning the study.

Table 2: Participant Demographics

| Demographic Categories | n (N = 336) | Percent |
|--------------------------------------|-------------|---------|
| Age | | |
| 18-20 | 203 | 60.4 |
| 21-22 | 80 | 23.8 |
| 23+ | 52 | 15.5 |
| Prefer not to say | 1 | 0.3 |
| Gender | | |
| Male | 158 | 47.0 |
| Female | 176 | 52.4 |
| Other | 2 | 0.6 |
| Race | | |
| Asian | 123 | 36.6 |
| White | 96 | 28.6 |
| Mixed | 48 | 14.3 |
| Hispanic | 35 | 10.4 |
| Black | 16 | 4.8 |
| Middle Eastern | 8 | 2.4 |
| American Indian or Alaskan Native | 3 | 0.9 |
| Other | 7 | 2.1 |
| Student Classification | | |
| Freshman | 28 | 8.3 |
| Sophomore | 140 | 41.7 |
| Junior | 74 | 22.0 |
| Senior | 33 | 9.8 |
| Graduate | 61 | 18.2 |
| Major (Engineering) | | |
| Biomedical | 156 | 46.4 |
| Computer Science | 69 | 20.5 |
| Mechanical | 24 | 7.1 |
| Electrical | 16 | 4.8 |
| Aerospace | 15 | 4.5 |
| Computer Systems | 13 | 3.9 |
| Information Technology | 9 | 2.7 |
| Chemical | 6 | 1.8 |
| Civil | 5 | 1.5 |
| Other | 23 | 6.8 |

Protocol

A new psychoanalytical instrument was developed to evaluate the interaction between pedagogical techniques and student academic and mental health outcomes. First, students were instructed to read through the consent form and consent to participate in the study. Next, they were asked to identify their gender, race, age, year, and major. Students were asked to complete the survey for their favorite professor or least favorite professor and were allowed to take the survey twice for both. There were three main sections of the survey: professor persuasion techniques, academic outcomes, and mental health outcomes.

Section 1 - Persuasion Techniques

Students were asked to rate their professors on their usage of six persuasion techniques in the classroom: reciprocity, coercive authority, expert authority, commitment, liking, and social proof. Scarcity was not included in the study because preliminary data demonstrated low impact, and scarcity is difficult to implement in a classroom setting. Instead, authority was divided into two separate methods: coercive authority and expert authority. To avoid bias, students were not informed that persuasion was being studied, and instead rated their professors on various methods that could be later categorized under specific persuasion techniques (Table 3). Participants were asked to rate these methods based on how often their professor used them, using a five-point Likert scale ranging from “Never” to “Always”.

Table 3: Persuasion Technique Questions

| Persuasion Technique | Methods |
|----------------------------|---|
| Reciprocity | <p>The professor gave us "gifts" (i.e., gave extra points, brought food/coffee, gave extra office hours).</p> <p>The professor allowed us to retake exams or quizzes.</p> <p>The professor allowed extensions on homeworks or assignments.</p> <p>The professor was lenient with attendance.</p> <p>The professor gave us opportunities to improve our grades (i.e., offering extra credit).</p> <p>The professor made suggestions for potential opportunities (i.e., research, tutoring, internships).</p> |
| Coercive Authority | <p>The professor was strict (i.e., no cellphones, no talking).</p> <p>The professor required attendance and it was tied to my grade.</p> <p>There were penalties for late assignments (i.e., grade reduction).</p> <p>The professor emphasized rules for their classroom.</p> <p>The professor used fear to control the classroom (i.e., kicked students out of class).</p> |
| Expert Authority | <p>The professor was an expert on course material.</p> <p>I trusted the professor as a credible source.</p> <p>I never questioned if what my professor said was true.</p> <p>My professor came to class well prepared.</p> <p>I did what the professor asked me to do because I respected them.</p> |
| Commitment and Consistency | <p>The professor acknowledged positive behaviors (i.e., complimenting students for speaking in class).</p> <p>The professor gave compliments to students or to the whole class (i.e. telling you you're timely, saying "this class is my smart class").</p> |

| | |
|--------------|--|
| | The professor had us make public commitments about the class (i.e., using team contracts, committing to your peers). |
| | The professor had us make public goals (i.e., "I will study every day"). |
| Liking | I had things in common with the professor. |
| | I liked the professor. |
| | The professor liked me. |
| | The professor cared about my success. |
| | I felt comfortable reaching out to the professor for help. |
| | The professor treated us as their equal. |
| Social Proof | The professor encouraged students to work with each other (i.e., allowing teamwork on homework, class discussions). |
| | The professor showed us what other students did to be successful (i.e., showed us previous students' work). |
| | The professor gave us information about how other students were studying. |
| | The professor encouraged us to connect with other students (i.e., through discord or group discussion boards). |

Section 2 - Academic Outcomes

Students were asked to rate their academic outcomes in the class including: their grade, the percent of classes they attended, and the percent of assignments they turned in on time. Grades included: A, B, C, or DEW for students who failed or withdrew from the course. The percentage of classes and assignments turned in on time included the following ranges: 0-60%, 60-80%, 80-90%, 90-100%.

Section 3 - Mental Health Outcomes

Mental health refers to “emotional, psychological, and social well-being” as well as the cognitive ability to successfully perform tasks⁴¹. This impacts the way one thinks, feels, acts, their executive functions, ability to handle stress, relationships with others, and more⁴². It differs from mental illness which refers to specific diagnosable disorders such as anxiety and depression⁴³. As a result, the mental health outcomes included student engagement, positive impact, psychological stress, mental well-being, and executive function (Table 4). Participants were asked to rate themselves on a five-point Likert scale ranging from “Strongly disagree” to “Strongly agree”. The executive function questions were developed based on an already existing executive function questionnaire⁴⁴, but questions were modified to specifically address classroom behavior.

Table 4: Mental Health Outcome Questions

| Variable | Questions |
|----------------------|---|
| Engagement | I felt engaged in this class/ found it easy to pay attention. |
| Positive Impact | This class had a positive impact on me. |
| Psychological Stress | This class increased my stress level. The classroom environment felt hostile. I did not feel supported in this class. I felt isolated in this class. |

⁴¹ Clark, “Mental Health vs. Mental Wellness | HealthFocus SA | University Health”; Gamm, Stone, and Pittman, “Mental Health and Mental Disorders—a Rural Challenge.”

⁴² Clark, “Mental Health vs. Mental Wellness | HealthFocus SA | University Health.”

⁴³ Gamm, Stone, and Pittman, “Mental Health and Mental Disorders—a Rural Challenge.”

⁴⁴ Guare and Dawson, “Executive Skills Questionnaire.”

| | |
|--------------------|--|
| Mental Well-being | <p>This class negatively affected my well-being.</p> <p>I stayed up late to work on this class.</p> <p>I skipped meals or overate when working on this class.</p> <p>I found it hard to focus in this class.</p> |
| Executive Function | <p>I forgot the assignments for this class or didn't have the things I needed to complete them.</p> <p>I had a hard time completing assignments for this class because I didn't remember the material presented.</p> <p>I had a hard time controlling my emotions when tasks in this class were too hard or confusing.</p> <p>I got upset when working on assignments for this class.</p> <p>If I got a problem wrong, I had a hard time coming up with a different solution.</p> <p>I had trouble paying attention in this class, and I was easily distracted.</p> <p>I had trouble sticking with tasks for this class until they were completed.</p> <p>I had difficulty planning and setting priorities for this class.</p> <p>I had trouble postponing fun activities in order to get work done for this class.</p> <p>I had a hard time estimating how long it would take me to complete tasks for this class.</p> <p>I put off tasks for this class until the last minute.</p> |

Data Analysis

A reliability analysis was conducted in order to determine the reliability of the questions presented in the psychoanalytical instrument. Cronbach's alpha scores were calculated for each of the six persuasion techniques to determine internal consistency.

Qualitative data was converted into quantitative data based on the five-point Likert scale. For the persuasion techniques, if a student rated their professor as “always” using one of the methods, it would be converted into a 4, “often” became 3, “sometimes” became 2, “rarely” became 1, and “never” became 0. Then, the average was taken of all of the methods within each technique, to give each professor a score between 0 and 4 for each of the six persuasion techniques. A score of 4 meant the professor was perceived to always use the persuasion technique, while a score of 0 meant the professor was perceived to never use the persuasion technique.

For academic outcomes, grades were converted into a numerical scale: A = 4, B = 3, C = 2, and DEW = 1. Attendance and assignments turned in on time were also converted into a numerical scale: 90-100% = 4, 80-90% = 3, 60-80% = 2, and 0-60% = 1. This allowed linear regression techniques to be used for statistical analysis. For academic outcomes, a higher number signified higher outcomes.

For mental health outcomes, the Likert scale was used to convert the outcomes on a scale of 1 to 5. For engagement, positive impact, and psychological stress, “strongly agree” was converted into a 5, “agree” into a 4, “neither agree nor disagree” into a 3, “disagree” into a 2, and “strongly disagree” into a 1. Mental well-being and executive function had the same Likert scale, but the numerical conversion was flipped (“strongly agree” = 1, etc.). For these outcomes a higher number meant higher outcomes (higher engagement, positive impact, stress, well-being, and executive function). Stress, well-being, and executive function all included multiple questions, so the average was taken across the respective outcome questions to get an overall score for each outcome.

Overall, higher scores for engagement, positive impact, well-being, and executive function, and lower scores for stress, represent better mental health.

Finally, to determine which techniques were more commonly perceived by students, the persuasion scores that scored above a 3 out of 4 were counted for each technique. Then, this was divided by the total number of participants to get a percentage of professors who were perceived as using these techniques often.

Statistical Analysis

To evaluate the relationship between the use of each persuasion technique and the student outcomes, a multiple linear regression was run, and a bivariate linear model was used to fit linear equations to the data. Based on the hypotheses, it is expected that as the amount of persuasion increases, grades, attendance, assignments, engagement, positive impact, well-being, and executive function will increase (positive slope) and stress will decrease (negative slope). This is expected to be the case for all persuasion techniques except coercive authority, which is expected to decrease grades, attendance, assignments, engagement, positive impact, well-being, and executive function (negative slope) and increase stress (positive slope) as the usage of coercive authority increases.

The independent variables for the analyses were the scores of each persuasion technique. The dependent variables were grades, attendance, and assignments for academic outcomes, and engagement, positive impact, stress, well-being, and executive function for mental health outcomes. A separate linear model and multiple linear regression was run for each dependent variable.

In the linear modeling, the lines of best fit were calculated for each technique across each outcome. In this model the slopes are bivariate, meaning they do not account

for all techniques simultaneously. This is useful in seeing the general trends of the scatterplot data, but a multiple regression is necessary to account for confounding variables and variance.

For the multiple linear regression, all six techniques were analyzed with respect to one outcome. This creates a model predicting the outcome based on the six techniques. The regression was re-run with only the significant techniques to create a more parsimonious model. The unstandardized B coefficients were calculated and used to determine the partial slopes of each technique, where a higher partial slope signifies that the technique was more impactful on the outcome. After this, the R^2 values were computed to determine how well the models predicted the outcomes. All statistical analyses were conducted using R Statistical Software⁴⁵ and IBM SPSS (Version 28.0)⁴⁶.

⁴⁵ R Core Team, "R: A Language and Environment for Statistical Computing."

⁴⁶ IBM Corp., "IBM SPSS Statistics."

RESULTS

Favorite/Least Favorite

Students selected their favorite or least favorite professor to evaluate in the survey. Favorite professors were evaluated by 213 students (63.8%) and least favorites were evaluated by 121 students (36.2%).

Reliability Analysis

The reliability analysis demonstrated high reliability for all six persuasion techniques. All Cronbach alpha scores were above 0.75 showing good internal consistency (Table 5), and analysis of each item showed that no question needed to be removed.

Table 5: Cronbach Alpha Scores of Reliability Analysis

| Technique | Cronbach Alpha Score |
|----------------------------|----------------------|
| Reciprocity | 0.863 |
| Coercive Authority | 0.775 |
| Expert Authority | 0.926 |
| Commitment and Consistency | 0.825 |
| Liking | 0.943 |
| Social Proof | 0.879 |

Persuasion Techniques vs Academic Outcomes

As perceived use of liking, social proof, and expert authority increased, various academic outcomes increased, and as perceived use of reciprocity increased attendance and assignments decreased (see Table 6). The multiple regression analysis showed that as use of liking and social proof increased, grades increased (all $P < 0.01$), with liking

having the highest partial slope and therefore being the most impactful on grades. As use of liking increased, attendance rates increased, but as reciprocity use increased, attendance rates decreased (all $P < 0.001$). Liking was also the most impactful on attendance rates. Finally, as use of expert authority increased, the percentage of assignments turned in on time increased ($P < 0.001$), while reciprocity had the opposite impact ($P = 0.023$). Expert authority was the most impactful technique on percent of assignments turned in on time.

The R^2 values show that 23.3% of the variance in grades can be explained by liking and social proof, 8.5% of the variance in attendance can be explained by reciprocity and liking, and 3.3% of the variance in assignments can be explained by reciprocity and expert authority. This means that although these techniques are impactful, they are not very strong predictors of the outcomes.

Table 6: Techniques Impacting Academic Outcomes

| Outcome | Techniques | p-value | Coefficients | R^2 |
|-------------|------------------|-----------|--------------|-------|
| Grades | Liking | < 0.001 | 0.246 | 0.233 |
| | Social Proof | 0.006 | 0.126 | |
| Attendance | Reciprocity | < 0.001 | -0.298 | 0.085 |
| | Liking | < 0.001 | 0.360 | |
| Assignments | Reciprocity | 0.023 | -0.097 | 0.033 |
| | Expert Authority | < 0.001 | 0.167 | |

The linear model shows the individual relationships between each technique and the academic outcomes (Figure 1). The line of best fit is shown based on scatterplot data.

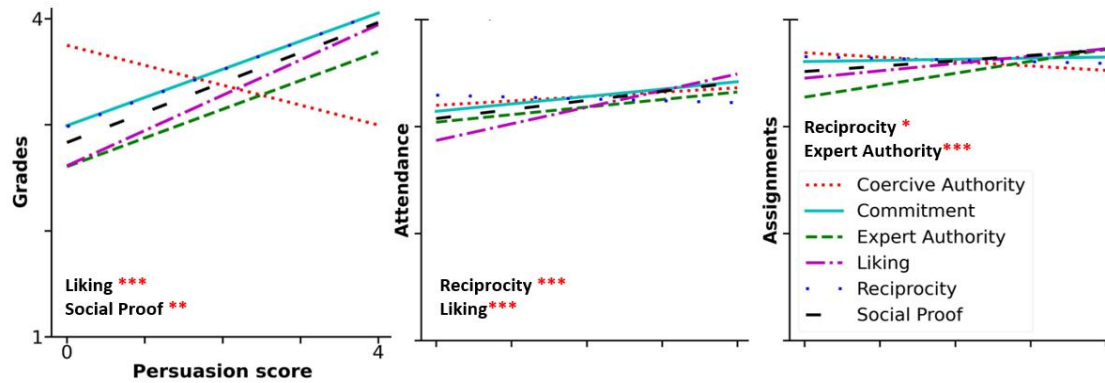


Figure 1: Effect of Six Persuasion Techniques on Academic Outcomes (grades, attendance, assignments). The lines of best fit show the relationship between use of persuasion techniques and student outcomes. The persuasion scores ranged from 0 to 4, and the academic outcomes ranged from 1 to 4. Significance denoted by stars (* = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$).

Persuasion Techniques vs Mental Health Outcomes

All persuasion techniques had a positive linear relationship with various mental health outcomes except coercive authority which had negative relationships, and reciprocity which had no relationship (Table 7). These relationships were flipped for stress. The multiple regression showed that as perceived use of expert authority, commitment, liking, and social proof increased, engagement scores increased (all $P < 0.05$), with liking and expert authority being the most impactful techniques. As use of expert authority, liking, and social proof increased, positive impact increased (all $P < 0.001$) with expert authority and liking being the most impactful. As use of expert authority, liking, and social proof increased, stress decreased, while increased use of coercive authority increased stress (all $P < 0.01$), with liking being the most impactful. Well-being increased with increased scores of liking and social proof and decreased with increased scores of coercive authority (all $P < 0.01$), and liking was the most impactful.

Finally, executive function increased with increased use of liking and social proof (all $P < 0.001$), with liking, again, being the most impactful technique.

The R^2 values show that 67.2% of the variance in engagement, 72.1% of the variance in positive impact, 66.7% of the variance in stress, 56.3% of the variance in well-being, and 46.6% of the variance in executive function can be explained by their respective impactful techniques. This means that these techniques are both impactful and strong predictors of the mental health outcomes.

Table 7: Techniques Impacting Mental Health Outcomes

| Outcome | Techniques | p-value | Coefficients | R^2 |
|--------------------|--------------------|---------|--------------|-------|
| Engagement | Expert Authority | < 0.001 | 0.439 | 0.672 |
| | Commitment | 0.024 | 0.135 | |
| | Liking | < 0.001 | 0.468 | |
| | Social Proof | < 0.001 | 0.206 | |
| Positive Impact | Expert Authority | < 0.001 | 0.521 | 0.721 |
| | Liking | < 0.001 | 0.506 | |
| | Social Proof | < 0.001 | 0.209 | |
| Stress | Coercive Authority | < 0.001 | 0.170 | 0.667 |
| | Expert Authority | < 0.001 | -0.232 | |
| | Liking | < 0.001 | -0.538 | |
| | Social Proof | 0.006 | -0.121 | |
| Well-being | Coercive Authority | 0.002 | -0.155 | 0.563 |
| | Liking | < 0.001 | 0.545 | |
| | Social Proof | < 0.001 | 0.200 | |
| Executive Function | Liking | < 0.001 | 0.429 | 0.466 |
| | Social Proof | < 0.001 | 0.225 | |

The linear model shows the individual relationships between each technique and the mental health outcomes (Figure 2). The line of best fit is shown based on scatterplot data.

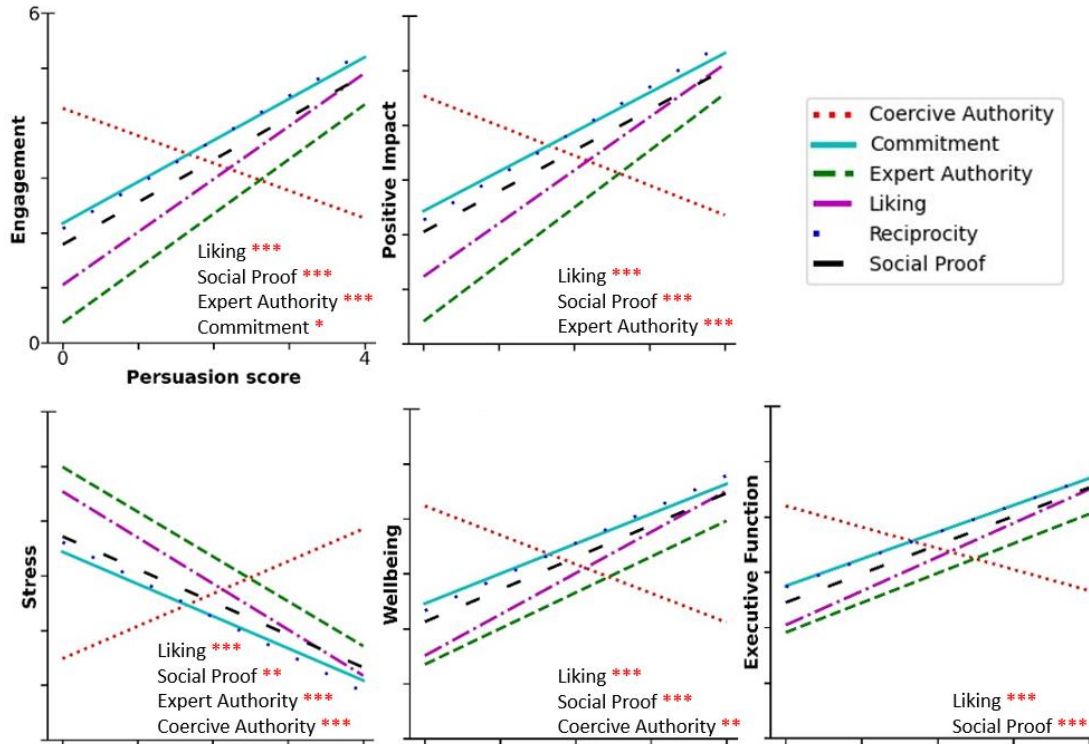


Figure 2: Effect of Six Persuasion Techniques on Mental Health Outcomes (engagement, positive impact, stress, wellbeing, executive function). The lines of best fit show the relationship between use of persuasion techniques and student outcomes. The persuasion scores ranged from 0 to 4, and the mental health outcomes ranged from 1 to 5; however, the lines of best fit extend past 1 and 5 so ticks range from 0 to 6 to capture the full model. Significance denoted by stars (* = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$).

Percent of Professors Using Persuasion Techniques

The most commonly perceived persuasion techniques were expert authority and liking (>50%) with the rest of the methods being perceived as used by less than half of the professors (Table 8).

Table 8: Percent of Professors Perceived Using Persuasion Techniques Often

| Method | Percent of Professors (%) |
|--------------------|---------------------------|
| Expert Authority | 68.5 |
| Liking | 51.3 |
| Social Proof | 35.9 |
| Reciprocity | 17.2 |
| Commitment | 20.8 |
| Coercive Authority | 11.6 |

DISCUSSION

The objective of this study was to evaluate the use of persuasion techniques in the classroom to improve mental health and enhance academic outcomes. I hypothesized that higher perceived use of reciprocity, liking, social proof, and commitment would lead to improved student outcomes, and higher perceived use of coercive authority would lead to worsened student outcomes. Student outcomes were considered improved if grades, attendance, assignments, engagement, positive impact, wellbeing, and executive function increased, or stress decreased, with increased persuasion use. The data partially supports these hypotheses, with student outcomes improving across liking, social proof, commitment, and expert authority, and worsening under coercive authority across almost all student outcomes.

Persuasion Techniques as an Effective Strategy in the Classroom

This study demonstrates that the persuasion techniques of liking, commitment and consistency, expert authority, and social proof may all be effective techniques to use in a classroom. These techniques were found to increase grades, improve engagement, create a more positive impact, decrease stress, improve mental well-being, and increase executive functioning. Liking and social proof may be especially beneficial, having a positive impact on the most outcomes: grades and all mental health outcomes.

Expert authority and liking were the most common techniques observed by students, but commitment and social proof are just as effective as these and should be utilized in classrooms. Over 50% of participants rated their professors as using expert authority and liking often. This is likely because expert authority and liking are the most naturally occurring techniques in education, whereas the other techniques require direct

implementation. In education, the classroom setting naturally places professors in a position of expert authority regardless of their years of experience or actual expertise⁴⁷, making expert authority common without intentional implementation. Additionally, liking can be optimized through implementation of specific methodology, but can also be perceived simply based on personality⁴⁸, meaning that professors do not have to intentionally implement liking if they are a naturally likable person. Methods such as social proof and commitment were not nearly as common, despite having positive impacts on student outcomes. Increasing the use of these techniques in university classrooms may have positive effects on student mental health, stress levels, grades, and many other outcomes. As a result, future studies should evaluate if training faculty to implement these less used outcomes can positively impact student outcomes.

Liking and expert authority were also found to be the most impactful techniques, but other techniques may also be impactful. Liking was the most impactful for grades, attendance rates, engagement, stress, well-being, and executive function. Expert authority was the most impactful for assignments turned in on time and positive impact. The impact of these techniques was always positive as well, meaning these techniques are strong predictors of student success. This demonstrates that building a positive student-teacher relationship may be the most important thing for improving students' academic success and mental health, and being an expert teacher is important for enhancing student learning. This is consistent with the literature showing that expert teachers have better use

⁴⁷ Berliner, "Learning about and Learning from Expert Teachers."

⁴⁸ Cialdini and Goldstein, "The Science and Practice of Persuasion."

of knowledge, have better classroom climates, and more effectively teach their students⁴⁹. Although these were found to be most impactful, this was due to the nature of the multiple regression which considers the influence of all six techniques at once. When techniques were considered separately in the bivariate linear model, they seemed to have similar effects on outcomes, but the multiple regression shows that expert authority and liking were the best predictors of student outcomes and had the strongest influence, somewhat overshadowing the influence of other techniques. As a result, future studies should implement commitment, reciprocity, and social proof into classrooms to further analyze the extent of their impact on outcomes.

Finally, this study also demonstrates that the use of coercive authority may be hindering student success. It was found to have a negative impact on stress and well-being. As a result, the other five persuasion techniques should be taught to faculty to promote student success, and professors should be discouraged from using coercive techniques and educated on the negative impacts of coercion as well.

Deviations in Reciprocity

Increased use of reciprocity was expected to improve outcomes, however, it instead decreased attendance rates and assignments turned in on time, while having no impact on the other outcomes, but this relationship may be acceptable. Attendance is important to consider because studies have shown that student performance decreases with decreased attendance, so professors should be aiming to increase attendance^{50,51}.

⁴⁹ Berliner, "Describing the Behavior and Documenting the Accomplishments of Expert Teachers."

⁵⁰ Hancock et al., *Student Attendance and Educational Outcomes*.

⁵¹ Credé, Roch, and Kieszczynka, "Class Attendance in College."

However, these studies were conducted when access to lecture was only in-person. Decreased attendance may be associated with the rising popularity of online classes and remote learning. Studies show that in a post-COVID era, online learning is being adopted at higher rates, and some universities have even seen improved student performance in online platforms⁵². Many students prefer online classes or remote learning because it is more accessible, it is self-paced, and it removes the need to commute to class⁵³. Many professors upload learning content online and students have adapted to online learning due to COVID, so in-person attendance may not be as valuable as it used to be. Additionally, data on attendance may be underpowered as 80% of students reported attending 80-100% of their classes, so limited data is available for lower rates of attendance. This does, however, demonstrate that many students are attending classes and as a result, attendance is not as necessary to improve. Moving forward, attendance should be studied by asking students about their in-person attendance, remote attendance, or if faculty are recording and uploading lectures that they watch in place of in-person attendance to determine their involvement in the class rather than focusing on in-person attendance. Additionally, reciprocity is likely associated with decreased attendance and assignments turned in because leniency with online learning or extensions for assignments may be perceived as gifts from the professor to the student. Future studies should further investigate this relationship to determine if this negatively impacts student outcomes.

⁵² Prasetyanto, Rizki, and Sunitiyoso, "Online Learning Participation Intention after COVID-19 Pandemic in Indonesia."

⁵³ Prasetyanto, Rizki, and Sunitiyoso.

Reciprocity may still be an effective technique to implement in the classroom. Because of the nature of the study and the multiple regression, reciprocity likely had confounding variables, and therefore was not found to improve outcomes. However, the linear model suggests that reciprocity could positively impact student mental health. Further study is required to determine reciprocity's impact, and this should be done by implementing reciprocity into classrooms and comparing it to a control to avoid confounding variables.

Mechanisms of Persuasion

There are several potential mechanisms for why persuasion influences student outcomes 1) stress, and 2) intrinsic motivation.

Persuasion Decreases Stress

One of the most important findings of the study is that these methods of persuasion decrease stress, which is known to impact many facets of learning including grades, executive function, and mental health. Studies have shown that stress inhibits the prefrontal cortex which is involved in executive functions⁵⁴. Executive functions such as working memory contribute to academic success and higher grades⁵⁵. Therefore, decreasing student stress is necessary to improve student academic success. In addition, high stress is associated with lower well-being and poor quality of life, and ongoing academic stress can lead to the development of mental health disorders such as anxiety

⁵⁴ Girotti et al., "Prefrontal Cortex Executive Processes Affected by Stress in Health and Disease."

⁵⁵ Monette, Bigras, and Guay, "The Role of the Executive Functions in School Achievement at the End of Grade 1."

and depression which is also associated with poor academic outcomes⁵⁶. With 50% of engineering students screening positive for mental health disorders, decreasing stress in education is necessary and urgent⁵⁷.

Finally, a literature review of 45 studies showed that high attrition rates in engineering were primarily related to psychological stress (e.g., lack of faculty support, hostile environment, lack of sense of belonging, and sense of isolation)⁵⁸. In engineering, attrition rates have remained around 50% over the last 70 years⁵⁹, meaning half of engineering students do not finish their degree. Therefore, decreasing psychological stress can also have an impact on engineering retention.

Improving student's grades, mental health, and retention starts with decreasing student stress, and this study demonstrates that professors should implement methods of persuasion such as liking, expert authority, or social proof to reduce stress for engineering students.

Persuasion Increases Intrinsic Motivation

Besides decreasing stress and improving mental health, these methods may also be effective in improving student outcomes because persuasion promotes intrinsic motivation. Reciprocity and liking involve generating positive student-teacher relationships. Studies show that these relationships increase student motivation because it gives the student a safe and supportive environment to focus on learning and take more

⁵⁶ Pascoe, Hetrick, and Parker, "The Impact of Stress on Students in Secondary School and Higher Education"; Newcomb-Anjo et al., "The Unique Associations of Academic Experiences With Depressive Symptoms in Emerging Adulthood."

⁵⁷ Andrew Danowitz and Kacey Beddoes, "(PDF) Mental Health in Engineering Education: Identifying Population and Intersectional Variation."

⁵⁸ Kuley, Maw, and Fonstad, "Engineering Student Retention and Attrition Literature Review."

⁵⁹ Geisinger and Raman, "Why They Leave: Understanding Student Attrition from Engineering Majors."

intellectual risks⁶⁰. This is effective in engineering because engineering possesses a culture of difficulty, suffering, and stress⁶¹, so a supportive environment from professors can help alleviate those feelings and improve ability to learn. Social proof involves creating strong peer relationships which have been shown to increase intrinsic motivation by improving a student's sense of belonging through shared experiences and reliance on one another⁶². The warmth between students creates a climate of comfort, decreasing psychological stress and making it easier for students to learn⁶³. Committing to public goals has been found to increase intrinsic motivation and self-efficacy because people have a desire to uphold their integrity, and this is associated with improved outcomes⁶⁴. Overall, intrinsic motivation may be influencing the effectiveness of the methods of persuasion in engineering classrooms, and future studies should examine student motivation in the classroom to determine if it impacts student outcomes.

Limitations and Future Directions

The present study is the first to specifically examine persuasion techniques in engineering education, and therefore future studies are required to determine reproducibility and validity. This study was primarily composed of respondents who identified as Asian (37%) or White (29%), leading to lower representations of other individual racial groups. However, this is likely representative of the population of engineering students. The most common ethnicities in U.S. universities for engineering

⁶⁰ Koca, "Motivation to Learn and Teacher-Student Relationship."

⁶¹ Jensen and Cross, "Engineering Stress Culture."

⁶² Furrer, Skinner, and Pitzer, "The Influence of Teacher and Peer Relationships on Students' Classroom Engagement and Everyday Motivational Resilience."

⁶³ Furrer, Skinner, and Pitzer.

⁶⁴ Latham, "The Motivational Benefits of Goal-Setting"; Mikami, "Relationships Between Goal Setting, Intrinsic Motivation, and Self-Efficacy in Extensive Reading."

majors are White (61.5%) and Asian (14.7%)⁶⁵. Additionally, these numbers do not include foreign nationals, so there are likely more Asian students than represented by the data. This study also had a large number of Biomedical Engineering (46.4%) and Computer Science (20.5%) majors, overshadowing the other fields of engineering. In the U.S., Mechanical Engineering is the most common engineering major, followed by Computer Science⁶⁶, so higher numbers of Computer Science majors are reflective of the actual population. In addition, Biomedical Engineering is the second most common engineering major for women⁶⁷, so higher numbers of Biomedical Engineering majors may be better reflective of the female population in engineering. This study had high numbers of female respondents (~50%) for an engineering study, and this is likely because Biomedical Engineers were recruited most. Future studies should aim to recruit more Mechanical Engineers to better model the population of engineering majors. They also should evaluate the specific impact of these techniques on different demographics as they may be more or less effective in different populations.

Another limitation of the study was the wording in recruitment. By having students choose a favorite or least favorite professor at the beginning, confirmation bias may have been present while answering questions about them. If they already perceive their professor in a positive or negative way, they may answer the questions in a way that confirms their perception. This could skew the results slightly; however, the majority of questions were directly related to the specific techniques used, and only a few were based

⁶⁵ Roy, "Engineering by the Numbers."

⁶⁶ Roy.

⁶⁷ Roy.

on student opinions, so this likely didn't have a detrimental impact on the data. Future research could focus on professors in general, rather than favorites or least favorites to avoid this potential bias.

Another limitation of this research was that it was an observational study, and therefore confounding variables were present. This was accounted for through the multiple regression, but because the techniques confounded each other, it was difficult to determine which ones impacted outcomes. For example, reciprocity seemed to have the same relationship on mental health outcomes as liking but was not significant due to confounding variables. Future studies should implement these techniques individually into classrooms to determine their actual effect on student outcomes without confounding variables.

Although the present research examined mental health, it did not examine mental health disorders. Future research should evaluate the impact of persuasion techniques on those who screen positive for mental health disorders compared to those who do not. Previous literature has found that students with emotional disorders responded well to caring and likable teachers⁶⁸ and had more on-task behavior when setting public goals⁶⁹. In addition, conflict in student-teacher relationships is correlated with poor mental health factors⁷⁰. Therefore, those with mental health disorders may be more responsive to persuasion techniques. This can be examined by having students take a mental health

⁶⁸ Mihalas et al., "Cultivating Caring Relationships Between Teachers and Secondary Students With Emotional and Behavioral Disorders."

⁶⁹ Lyman, "The Effect of Private and Public Goal Setting on Classroom On-Task Behavior of Emotionally Disturbed Children."

⁷⁰ Drugli, "How Are Closeness and Conflict in Student-Teacher Relationships Associated with Demographic Factors, School Functioning and Mental Health in Norwegian Schoolchildren Aged 6-13?"

screening before completing the survey presented in this study, and then analyzing responses of those who screen positive versus negative.

Finally, this study only evaluates the students' perception of their professors' use of persuasion but doesn't examine the professors' perspectives. Future research should examine the professors' perspectives to evaluate which methods they believe are most effective, their intentional or unintentional use of persuasion techniques, and how this impacts their students' outcomes.

Conclusions

The utilization of persuasion techniques significantly improved student outcomes including grades, engagement, positive impact, stress, mental well-being, and executive function. Liking, social proof, commitment, and expert authority are all effective techniques, and professors should utilize these methods in their classroom. This study demonstrates that building a positive relationship with students (liking), or helping students build relationships with others (social proof) are effective ways of improving student outcomes. On the contrary, methods that utilize control and power were found to harm student learning and mental health. This shows that the interaction between the professor and students is much more important for student success than solely focusing on teaching the content of the class. By improving student outcomes, professors can increase engineering student retention and help more students succeed in this field by improving their grades, mental health, and stress.

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APPENDIX A
IRB APPROVAL



APPROVAL: MODIFICATION

[Claire Honeycutt](#)

IAFSE-BHSE: Bioengineering, Harrington Department of
480/965-8453
Claire.Honeycutt@asu.edu

Dear [Claire Honeycutt](#):

On 11/16/2022 the ASU IRB reviewed the following protocol:

| | |
|---------------------|---|
| Type of Review: | Modification / Update |
| Title: | The Effect of Persuasion Methods on Student Performance and Mental Health in Engineering Education |
| Investigator: | Claire Honeycutt |
| IRB ID: | STUDY00015569 |
| Funding: | None |
| Grant Title: | None |
| Grant ID: | None |
| Documents Reviewed: | <ul style="list-style-type: none">• IRB Protocol, Category: IRB Protocol;• Recruitment Posters, Category: Recruitment Materials; |

The IRB approved the modification.

When consent is appropriate, you must use final, watermarked versions available under the “Documents” tab in ERA-IRB.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

CONSENT FORM

We are students under the direction of Professor Honeycutt in the Department of Biomedical Engineering at Arizona State University. We are conducting a research study to better understand the methods professors use to help develop more effective teaching and learning methods for future courses.

We are inviting your participation, which will involve taking a brief survey. It should take about 10 minutes and covers teaching methods and questions on performance in the class and mental health. You have the right not to answer any question, and to stop participation at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, and professors will not have access to any information until after final grades are posted. You must be 18 or older and an ASU student to participate in the study.

Participants who are interested will be entered into a drawing to win one of ten \$50 gift cards. In addition, we hope to use the data and information to help professors use more effective teaching methods that value the student's learning and time, as well as help professors, have a better influence on their students. There are no foreseeable risks or discomforts to your participation.

Confidentiality will be protected by keeping all data locked in a password-protected document, and not sharing individual responses with anyone else. Your responses will be anonymous. The results of this study may be used in reports, presentations, or publications but your name will not be used. Results will only be shared in the aggregate form. De-identified data collected as a part of the current study will not be shared with others for future research purposes or other uses.

If you have any questions concerning the research study, please contact the research team at: djpautz@asu.edu (investigator) or rldharan@asu.edu (investigator) or cfhoneyc@asu.edu (PI). If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know if you wish to be part of the study. By pressing "I consent" below you are acknowledging that you read the consent form and agree to be part of the study.

APPENDIX C
PSYCHOANALYTICAL INSTRUMENT

Education and Mental Health

The purpose of this survey is to better understand the methods professors use to help develop more effective teaching and learning methods for future courses.

Please choose your **least favorite** or **favorite** professor (preferably from a more recent semester so you can better remember their methods). At the end of the survey, you may enter the drawing for **\$50!** We need as many responses as possible so if you take the survey twice (once for favorite and once for least favorite professors) you can enter the drawing twice and win up to **\$100!** You must be an **engineering major at ASU** to participate.

The questions will ask you to rate methods based on how often your professor used them. In addition, we will ask questions on your mental health and related factors.

Consent

We are students under the direction of Professor Honeycutt in the Department of Biomedical Engineering at Arizona State University. We are conducting a research study to better understand the methods professors use to help develop more effective teaching and learning methods for future courses.

We are inviting your participation, which will involve taking a brief survey. It should take about 10 minutes and covers teaching methods and questions on performance in the class and mental health. You have the right not to answer any question, and to stop participation at any time.

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Confidentiality will be protected by keeping all data locked in a password-protected document, and not sharing individual responses with anyone else. Your responses will be anonymous. The results of this study may be used in reports, presentations, or publications but your name will not be used. Results will only be shared in the aggregate form. De-identified data collected as a part of the current study will not be shared with others for future research purposes or other uses.

If you have any questions concerning the research study, please contact the research team at: djpautz@asu.edu (investigator) or rldharan@asu.edu (investigator) or cfhoneyc@asu.edu (PI). If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know if you wish to be part of the study.

By pressing "I consent" below you are acknowledging that you read the consent form and agree to be part of the study.

Do you consent to be apart of this study? *

Yes

Are you an ASU engineering student? *

Yes

No

Demographics

What gender do you identify with?

- Male
- Female
- Prefer not to say
- Other: _____

What race do you identify as?

- American Indian or Alaska Native
- Asian
- Black or African American
- Native Hawaiian or other Pacific Islander
- Middle Eastern
- Hispanic
- White
- Prefer not to say
- Other: _____

How old are you?

- 18-20
- 21-22
- 23-25
- 26-30
- 31-40
- Older than 40
- Prefer not to say

What year are you?

- Freshmen
- Sophomore
- Junior
- Senior
- Graduate
- Other: _____

What is your major?

Your answer _____

Is this survey for your favorite or least favorite professor?

- Favorite
- Least favorite

Methods

Rate these methods based on how often your professor used them

| | Never | Rarely | Sometimes | Often | Always |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| The professor gave us "gifts" (i.e. gave extra points, brought food/coffee, gave extra office hours) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor allowed us to retake exams or quizzes | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor allowed extensions on homeworks or assignments | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor was lenient with attendance | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor gave us opportunities to improve our grades (i.e. offering extra credit) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor made suggestions for potential opportunities (i.e. research, tutoring, internships) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The professor was strict (i.e. no cellphones, no talking)

The professor required attendance and it was tied to my grade

There were penalties for late assignments (i.e. grade reduction)

The professor emphasized rules for their classroom

The professor used fear to control the classroom (i.e. kicked students out of class)

The professor was an expert on course material

I trusted the professor as a credible source

I never questioned if what my professor said was true

My professor came to class well prepared

I did what the professor asked me to do because I respected them

The professor acknowledged positive behaviors (i.e. complimenting students for speaking in class)

The professor gave compliments to students or to the whole class (i.e. telling you you're timely, saying "this class is my smart class")

The professor had us make public commitments about the class(i.e. using team contracts, committing to your peers)

The professor had us make public goals (i.e. "I will study every day")

| | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I had things in common with the professor | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I liked the professor | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor liked me | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor cared about my success | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I felt comfortable reaching out to the professor for help | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The professor treated us as their equal | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

The professor encouraged students to work with each other (i.e. allowing teamwork on homework, class discussions)

The professor showed us what other students did to be successful (i.e. showed us previous students' work)

The professor gave us information about how other students were studying

The professor encouraged us to connect with other students (i.e. through discord or group discussion boards)

Impact

What was your grade in this class?

- A
- B
- C
- D
- F
- Other: _____

What percent of these classes did you attend?

- 0-20%
- 20-40%
- 40-60%
- 60-80%
- 80-90%
- 90-100%

What percent of assignments did you turn in on time?

- 0-20%
- 20-40%
- 40-60%
- 60-80%
- 80-90%
- 90-100%

Rate these statements:

| | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|--|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| I felt engaged in this class/ found it easy to pay attention | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| This class had a positive impact on me | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Mental Health Related to the Class

Rate these statements:

| | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|---|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| This class negatively affected my well being | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| This class increased my stress level | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I stayed up late to work on this class | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I skipped meals or overate when working on this class | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I found it hard to focus in this class | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The classroom environment felt hostile | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I did not feel supported in this class | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I felt isolated in this class | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Executive Function in the Classroom

Rate these statements:

| | Strongly disagree | Disagree | Neither agree nor disagree | Agree | Strongly agree |
|--|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|
| I forgot the assignments for this class or didn't have the things I needed to complete them | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I had a hard time completing assignments for this class because I didn't remember the material presented | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

| | | | | | |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I had a hard time controlling my emotions when tasks in this class were too hard or confusing | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I got upset when working on assignments for this class | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I got a problem wrong, I had a hard time coming up with a different solution | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I had trouble paying attention in this class, and I was easily distracted | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

I had trouble sticking with tasks for this class until they were completed

I had difficulty planning and setting priorities for this class

I had trouble postponing fun activities in order to get work done for this class

I had a hard time estimating how long it would take me to complete tasks for this class

I put off tasks for this class until the last minute