The Relationship Between Test-Anxiety, Test Performance, Metacognitive Beliefs and Self-esteem in College Students

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Academics are often future-determining factors for students all across the globe. Education is the mediating factor to relative success in most cases (Becker et al., 2019). This places a high importance on adequate academics for the future success of individuals. Adequate academics goes beyond mere access to education. As everyone's experience is different, there are subjectively more effects that play into future success than just the opportunity to pursue an education. The social, familial, and classroom environment might have an effect on the success of students as well (Orth et al., 2012). Test anxiety is often a limiting factor for student success which can lead to an academic performance not representative of the knowledge those students possess. As academic performance is frequently associated with future success, it is important that there is a better understanding of the positive and negative mediating roles that test anxiety, environment, and perceived self-esteem might have on a student.

Self-Esteem

A student's self esteem is often associated with their relative academic success. This contingent self-esteem can in turn affect academic performance and subsequent self-perception within the classroom (Fairamb, 2022). The effects of self-esteem can reach far beyond internal perception and can lead to negative external performance in both the academic setting and the vocational pursuits beyond education (Resnick et al., 1970). Self-esteem also has a large effect on the trajectories of depression, job satisfaction, health, negative affect, and positive affect. Higher levels of education are consistently associated with higher trajectory for self-esteem levels (Orth et al., 2012)

Mediating Role of Self-Esteem

Overall, self-worth contingent on external factors like academic success is not beneficial. Individuals with more contingent self-esteem can experience a lowering of their self-esteem by external occurrences such as a singular lower score on an exam. This can lead to an overall grade that is more associated with lower self-esteem than any sort of substantial knowledge presented by the student (Fairlamb, 2022). Authentic self-esteem (the promotion of collective positive self-views) can have mediating value between the effects of parenting on adolescents' well-being (Boulton et al., 2022). There is support for the statement that self-esteem is a central component of mental health as it plays a mediating and protecting role for negative school experiences and lack of parental competency in handling challenges (Boulton et al., 2022). In the clinical setting, there is a need for professionals to provide education for parents on the importance of fostering healthy responses to challenges to improve their children's authentic self-esteem (Boulton et al., 2022). The presence of positive self-esteem can mediate negative external experiences (Boulton et al., 2022) such as failing a test, however it can be highly influenced by those negative external factors as well (Fairlamb, 2022). Lower self-esteem could lead to an increase in deviant behavior and thus a decrease in academic success (Zimmermann et al., 2013). There is a two-way relationship between self-esteem and academic success, both can affect one another. External support, in the form of non-academic and academic positive reinforcement, from educators for individuals who are showing signs of problem behavior could be beneficial (Zimmermann et al., 2013).

Self-handicapping Behavior

Academic self-handicapping (also known as self-sabotage) is an often habitual strategy students employ to protect their self-esteem when they are predicting academic failure

(Schwinger et al., 2022). It can be characterized by procrastination, setting unattainable goals, and a lack of effort (Schwinger et al., 2022). The intention is often to act in a way that self-sabotages but is presented as an external factor so as to preserve self-image and self-esteem (Schwinger et al., 2022). Higher levels of test-anxiety is associated with an increased engagement in self-handicapping behavior (Harris et al., 1986). Individuals with high self-esteem may modulate their behavior and claim a "lack of effort" on the given test to ensure their perception of intelligence was maintained. The highest self-handicapping values are associated with students who have a low-unstable self-esteem profile (Schwinger et al., 2022). Additionally, anxiety can also be used as a self-protecting or self-handicapping behavior itself (Smith et al., 1982).

Effects of Metacognition

At the core of these self-handicapping behavior is the internal driving force of different beliefs and mindsets. Metacognitive beliefs have a self-regulatory role and are essentially the beliefs individuals hold about their own cognition (Fergus et al., 2020). These metacognitive beliefs can be both positive and negative. Negative metacognitive beliefs about uncontrollability and risk were associated with an increase in test anxiety (Fergus et al., 2020). This indicates that test anxiety interventions could focus on identifying students with higher negative metacognitive beliefs to provide assistance (Fergus et al., 2020). Another internal driver is negative self-statements and a fixed intelligence mindset, both of which are more frequently believed, regardless of academic performance, among test anxious students (Bruch et al., 1986),(Gál, É. & Szamosközi, I. 2021). Students who are anxious, yet academically successful, tend to hold more external factors as having influence on their performance rather than the internally-focused mindset of the less successful, test-anxious students (Bruch et al., 1986). When students are high

in self-control resources they are able to prioritize their attention on the test itself rather than the anxiety they are experiencing (Bertrams et al., 2013). The presence or absence of the external self-control resources is correlated with fluctuations in test performance in an anxious state (Bertrams et al., 2013). Self-esteem is also found to sufficiently predict externalizing problem behavior and act as the mediator of grades and problem behavior (Zimmermann et al., 2013).

Statement of the Problem

The literature on the relationship between self-esteem and test-anxiety indicates that there are many different mediating factors such as education, positive metacognitive beliefs, and fixed intelligence mindset in this relationship. There is also no comprehensive analysis on self-esteem as an external influence, self-handicapping, and mediating factor. The literature examines only one role of self-esteem at a time. A strength of the literature is that a variety of variables have been examined, all with sufficient detail. The internal influencers on test-anxiety and self-esteem (metacognitive beliefs, fixed intelligence mindset, and external locus of control) all provide detailed insight into the correlational relationships there. To accurately understand the relationship between test anxiety and self-esteem more research needs to be done on what differentiates between an anxious high-performer, and anxious low-performer in an academic setting. The differences between these two were not adequately addressed in the literature.

From examining the available literature, test anxiety and low self-esteem could affect the validity of certain academic examinations especially if it limits students from performing successfully. There is a need to ensure that students, whose future is often tied to academic success, are adequately educated and assisted in understanding the many layers of internal and external influence that can be in effect. This research will be based on the following question: How are metacognitive beliefs and self-esteem related to test anxiety and academic

performance? This research is focused on better understanding the tenuous relationship between test-anxiety and academic performance by analyzing the possible mediating effects of metacognitive beliefs and self-esteem. This research will aid in contributing more information and insight to the existing literature on test anxiety and test performance and the mediating variables between the two. As the research expands on this topic more scientifically-based coping strategies can be taught and utilized by students suffering from this form of anxiety.

Hypothesis

Three hypotheses will guide this study:

1. There will be a significant relationship between test-anxiety and test performance.
2. There will be a significant relationship between self-esteem and test anxiety.
3. There will be a significant relationship between metacognitive beliefs and test anxiety.

Null hypotheses:

1. There will not be a significant relationship between test-anxiety and test performance or self esteem.
2. There will not be a significant relationship between self-esteem and test anxiety.
3. There will not be a significant relationship between metacognitive beliefs and test anxiety.

Research Questions

Two research questions will be examined in this study:

1. What is the difference (if any) between students who are test-anxious and academically successful, when compared to those that are test-anxious and not academically successful?
2. Are positive or negative metacognitive beliefs associated with high or low self-esteem?

Methodology

Design

This study will utilize a quantitative, correlational research design to observe relationships amongst the variables of interest. The intention is to collect data using survey methodology. Comparisons will be made in particular between low and high test anxiety, low and high self-esteem, overall test performance and metacognitive beliefs.

Measurement

For the measure of metacognitive beliefs the *State Measure of Cognitive Beliefs* will be used (see Appendix A). This questionnaire focuses on the measurement of state-like metacognitive beliefs specifically affiliated with cognitive diffusion and cognitive reappraisal. This scale has 6 items each measured on a VAS 100 mm rating scale from "completely disagree" to "completely agree" (Yovel et al. 2014). The two subscales of cognitive diffusion and cognitive reappraisal are negatively correlated with each other, $r(134) = -0.26$, $p = 0.002$. The Cronbach's coefficient alphas for the sample were 0.55 and 0.43 for reappraisal and acceptance respectively (PsycTests Database Record © 2020 APA, all rights reserved). Higher scores indicate a higher level of the metacognitive beliefs.

The *Six-Item State Self-Esteem Scale (SSES-6)* is a modified scale from the 20-item State Self-Esteem Scale (SSES; Heatherton & Policy, 1991) and will be used as the measure of self-esteem (see Appendix B). The response format is a scale from 1(not at all) to 7 (extremely) with an internal reliability of as > .75 and a test-retest reliability of .81 for the composite scores and .7 for each individual subscale of performance, social, and appearance (Webster et al., 2022). A lower score associated with low self-esteem and a higher score associated with higher self-esteem.

Test anxiety will be measured through the *Multidimensional Test Anxiety Scale (MTAS)*. It is a 16-item scale with students responding to each statement using a 5-point scale from 1 = strongly disagree to 5 = strongly agree (see Appendix C). The test-retest correlation was r = .80, for the MTAS total score, r = .80 for Worry, r = .70 for tension, r = .82 for Physiological Indicators, and r = .70 for Tension (Putwain et a., 2021). Higher scores indicate higher levels of test anxiety.

Studies indicate that a measure of academic achievement can be operationalized as a students' GPA, grades or test scores. Test performance and overall academic performance will be measured during the demographic section using a self-report brief questionnaire about current GPA, and the student's five most recent test scores (Fong et al., 2023). These questions are found listed in the appendix *Demographic Questionnaire* (see Appendix D). Additional demographic information will be collected on age, ethnicity, gender, year, and major through questions listed in the appendix (see Appendix D).

Participants

The proposed population of interest is undergraduate college students ages (18-25) enrolled at Southern Adventist University. The desired participants are of any ethnicity, major, class standing, and GPA. Participants will be recruited through convenience sampling on Social Media platforms such as Instagram with verified Southern Adventist University Students. All participants will be treated in accordance with the Ethical Principles of Psychologists and Code of Conduct of the American Psychological Association (American Psychological Association, 2010). The desired sample size is above n = 30.

Procedures

A post will be made on Instagram, and a standardized email will be sent to one class from each major on campus. The post and email will provide a link to a survey that contains an introduction to the study, myself and the research class I am taking. Participants will be presented with the informed consent form (see Appendix E) and asked if they give consent to participate in the study. After agreeing, the participants will be directed to the remainder of the survey which is approximately 10 minutes in length. After all the participants have completed the survey, the data will be collected, scored, coded and analyzed in SPSS.

Data Analysis

Descriptive statistics will be calculated for all the major variables of the study. Statistical inference will be calculated for each hypothesis using Pearson's *r* Correlation. Each hypothesis will be measured using a separate Pearson's *r* test (Hypothesis 1-3).

Limitations

There are three major limitations in this study:

1. The population of interest is a small, private, Christian university and thus results might not be generalizable to the average college student. This limitation can be addressed by using a random sample.
2. Students could possibly inflate or deflate their self-report GPA and or test scores. This will be combated by indicating that the survey responses are confidential and not connected to their name in any manner.
3. The Cronbach's coefficient alphas for the *State Measure of Cognitive Beliefs* sample are quite low with values of 0.55 and 0.43 for reappraisal and acceptance respectively. The

ideal range is 0.80 and above. However, because this is such a small scale with very few questions,

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Appendix

Appendix A

State Measure of Cognitive Beliefs

Instructions: Please choose the item that best describes you.

I believe it is important to examine the verity of my thought.	100mm VAS from “completely disagree to “completely agree”
I think I need to correct my thought.	100mm VAS from “completely disagree to “completely agree”
I believe that my thought results from irrational thinking	100mm VAS from “completely disagree to “completely agree”
I think that the thought I had defines me and the person I am.	100mm VAS from “completely disagree to “completely agree”
I believe that my thought is only a thought that crossed my mind, and nothing more.	100mm VAS from “completely disagree to “completely agree”
I believe that the very existence of this thought prevents me from living my life the way I’d want to.	100mm VAS from “completely disagree to “completely agree”

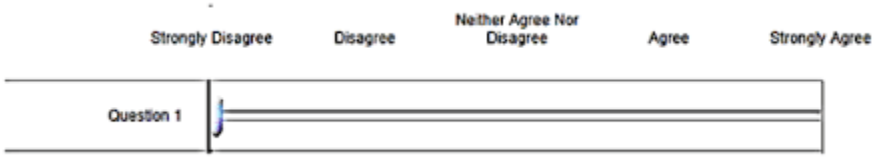

Figure A1. Sample of 100 mm Visual Analog Scale (VAS)

State Measure of Cognitive Beliefs Scoring

1. Items 4 and 6 are reverse scored and added together.
2. Items 1, 2, 3, and 5 are added together.
3. The total score for the scale is calculated by adding the results together.

All 6 of the items are measured by a 100 mm VAS ranging from “completely disagree” to “completely agree.” Higher scores indicate a higher level of the metacognitive beliefs.

Appendix B

Six-Item State Self-Esteem Scale (SSES-6)

Instructions: It is a 24-item questionnaire with a response scale from 1 (not at all) to 7 (extremely) with the following stem: “This is a questionnaire designed to measure what you are thinking at this moment. There is, of course, no right answer for any statement. The best answer is what you feel is true of yourself at the moment. Be sure to answer all of the items, even if you are not certain of the best answer. Again, answer these questions as they are true for you RIGHT NOW.”

	Not at all true of me	**Unlikely** to be true of me	**Somewhat unlikely** to be true of me	**Moderately** true of me	**Somewhat likely** to be true of me	**Likely** to be true of me	**Extremely** true of me
I feel satisfied with the way my body looks right now.	1	2	3	4	5	6	7
I feel frustrated or rattled about my performance.	1	2	3	4	5	6	7
I am worried about what other people think of me.	1	2	3	4	5	6	7
I feel unattractive.	1	2	3	4	5	6	7
I feel like I'm not doing well	1	2	3	4	5	6	7
I am worried about looking foolish.	1	2	3	4	5	6	7

Six-Item State Self-Esteem Scale (SSES-6) Scoring

1. Item 4 is reverse scored and added to item 1 for the appearance subscore.
2. Items 2 and 5 are reverse scored and added for the performance subscore.
3. Items 3 and 6 are reverse scored and added for the social subscore.
4. The sum of all the subscores gives the overall self-esteem score with a lower score associated with low self-esteem and a higher score associated with higher self-esteem.

Appendix C

Multidimensional Test Anxiety Scale (MTAS)

Instructions: Please rate the statements on a 5-point scale from 1 = strongly disagree to 5 = strongly agree.

		strongly disagree	disagree	neutral	agree	strongly agree
1.	Before a test/exam, I am worried I will fail.	1	2	3	4	5
2.	I forget previously known material before taking a test/exam.	1	2	3	4	5
3.	Even when I have prepared for a test/exam I feel nervous about it.	1	2	3	4	5
4.	Before I take a test/exam my hand trembles.	1	2	3	4	5
5.	I am afraid of writing the wrong answer during a test/exam.	1	2	3	4	5
6.	I forget facts I have learnt during tests/exams.	1	2	3	4	5
7.	I feel tense before taking a test/exam.	1	2	3	4	5
8.	My heart races when I take a test/exam.	1	2	3	4	5
9.	After a test/exam, I am worried I have failed.	1	2	3	4	5
10.	During tests/exams, I forget things that I have learnt.	1	2	3	4	5
11.	Just before I take a test/exam, I feel panicky.	1	2	3	4	5

12. During a test/exam I experience stomach discomfort.	1	2	3	4	5
13. After taking a test/exam, I worry that I gave the wrong answers.	1	2	3	4	5
14. During tests/exams, I find it hard to concentrate.	1	2	3	4	5
15. Before a test/exam, I feel nervous.	1	2	3	4	5
16. My hand shakes while I am taking a test/exam.	1	2	3	4	5

Multidimensional Test Anxiety Scale (MTAS) Scoring

1. Items 1, 5, 9, and 13 are added together and represent the “worry” subscore.
2. Items 2, 6, 10, and 14 are added together and represent the “cognitive interference” subscore.
3. Items 3, 7, 11, and 15 are added together and represent the “tension” subscore.
4. Items 4, 8, 12, and 16 are added together and represent the “physiological indicators” subscore.
5. The sum of all the scores gives the overall test anxiety score. Higher scores indicate higher levels of test anxiety.

Appendix D

Demographic Questionnaire

Instructions: Please choose the answer that best describes you.

Age	**:_____**
Gender	● **Male** ● **Female** ● **other**
Ethnicity	● **African American** ● **Lation or Hispanic** ● **Asian** ● **Native American** ● **Native Hawaiian or Pacific Islander** ● **Caucasian**
Year	● **Freshman (year 1)** ● **Sophomore (year 2)** ● **junior (year 3)** ● **Senior (year 4)**
Major	● **Allied Health** ● **Biology** ● **Business and Management** ● **Chemistry** ● **Computing** ● **Education and psychology** ● **English** ● **General Studies** ● **History and Political Sciences** ● **Interdisciplinary** ● **Journalsim and Communication** ● **Mathematics** ● **Modern Languages** ● **Music** ● **Nursing** ● **Physical Education, Health, and Wellness** ● **Physical Therapy Assistant** ● **Physics** ● **Religion** ● **Social Work** ● **Technology**

	● **Visual Art and Design**
Current GPA	**:_____**
Five previous test scores	**1. _____** **2. _____** **3. _____** **4. _____** **5. _____**

Demographic Questionnaire Scoring

Data will be scored and coded using the following answer keys and analyzed using the SPSS system:

1. *Self-esteem* will be measured using the Six-Item State Self-Esteem Scale (SSES-6) using a scale from 1 (not at all) to 7 (extremely). Higher scores are associated with higher levels of self-esteem.
2. *Metacognitive beliefs* will be measured using the State Measure of Cognitive Beliefs using a VAS 100 mm rating scale from "completely disagree" to "completely agree." Higher scores indicate a higher level of the metacognitive beliefs.
3. Test-anxiety will be measured using the Test Anxiety Measure for College Students-Short Forms (TAM-C-SF) using a 4-point scale from 1 (never) to 4 (almost always). Higher scores indicate higher levels of test-anxiety.
4. The demographic variables will be coded:
    a. Age in years:____
    b. Gender: Males = 1, Females = 2, other = 3
    c. Ethnicity: African American = 1, Latino or Hispanic = 2, Asian = 3, Native American = 4, Native Hawaiian or Pacific Islander = 5, Caucasian = 6
    d. Year: Freshman (year 1) = 1, Sophomore (year 2) = 2, Junior (year 3) = 3, senior (year 4) = 4
    e. Major: Allied Health = 1, Biology = 2, Business and Management = 3, Chemistry = 4, Computing = 5, Education and psychology = 6, English = 7, General Studies = 8, History and Political Sciences = 9, Interdisciplinary = 10, Journalism and Communications = 11, Mathematics = 12, Modern Languages = 13, Music = 14,

Nursing = 15, Physical Education, Health and Wellness = 16, Physical Therapy Assistant = 17, Physics = 18, Religion = 19, Social Work = 20, Technology = 21, Visual Art and Design = 22.

f. Current GPA: ____

g. Five previous Test scores in percentage form:

   i. _____

   ii. _____

   iii. _____

   iv. _____

   v. _____

Appendix E

Test Anxiety Study

INFORMED CONSENT FORM

My name is Amie Shelley. I am an undergraduate student in the Psychology program at Southern Adventist University. I am conducting a research study on test-anxiety, metacognitive beliefs, self-esteem and how those variables relate to each other and to test performance and academic performance. I am completing this research as part of my bachelor degree for Research Design & Statistics II class. Your participation is completely voluntary. I am seeking your consent to involve you and your information in this study. Reasons you might ***not*** want to participate in the study include any trauma or extreme discomfort relating to academic performance. Reasons you might want to participate in the study include adding to the literature on test-anxiety and the variables associated with it. An alternative to this study is simply not participating. I am here to address your questions or concerns during the informed consent process.

PRIVATE INFORMATION

Certain private information may be collected about you in this study. I will make the following effort to protect your private information, including assigning a number to each set of information, and locking the files with a password. Any results will be reported as group aggregates not individual sets of data. Even with this effort, there is a chance that your private information may be accidentally released. The chance is small but does exist. You should consider this when deciding whether to participate.

Activities:

If you participate in this research, you will be asked to:

1. Complete a selection of two short surveys on self-esteem, and metacognitive beliefs respectively (approximately 5 minutes)
2. Compete a moderately-lengthed survey on test-anxiety (approximately 5 minutes)
3. Complete a brief demographic questionnaire (approximately 5 minutes)

Eligibility:

You are eligible to participate in this research if you:

1. Are of the ages of 18 or older

2. College student at Southern Adventist University

You are not eligible to participate in this research if you:

1. Under the age of 18
2. Not a college student at Southern Adventist University

I hope to include 100 people in this research.

Risks:

There are minimal risks in this study. Some possible risks include stress or discomfort associated with academics.To decrease the impact of these risks, you can skip any question or stop participating at any time.

Benefits:

If you decide to participate, there are no direct benefits to you.

Confidentiality:

The information you provide will be kept confidential to the extent allowable by law. A step I will take to keep your identity confidential are: assigning each set of information a number rather than a name. The people who will have access to your information are: myself and my academic advisor Dr. Tron Wilder. The Institutional Review Board may also review my research and view your information.

I will secure your information by locking the computer file with a password. I will keep your data for 7 years. Then, I will delete electronic data and destroy paper data.

Contact Information:

If you have questions for me, you can contact me at: amies@southern.edu

My academic advisor's name is Dr. Tron Wilder. He works at Southern Adventist University and is supervising me on the research. You can contact him at (423) 236-2937 or thwilder@southern.edu

If you contact us you will be giving us information like your phone number or email address. This information will not be linked to your responses if the study is anonymous.

If you have questions about your rights in the research, or if a problem has occurred, or if you are injured during your participation, please contact the Institutional Review Board at: irb@southern.edu or 423-236-2285.

Voluntary Participation:

Your participation is voluntary. If you decide not to participate, or if you stop participation after you start, there will be no penalty to you.

Future Research

Any information or specimens collected from you during this research may **not** be used for other research in the future, even if identifying information is removed.

Signature: By selecting agree you indicate that you are at least 18 years of age, have read the informed consent form and voluntarily agree to participate in this study.

If you have any questions about your rights as a research participant or if you feel you have been placed at risk through the course of this survey please contact Dr. Tron Wilder.