The Role of Academic Hardiness in Predicting Student Persistence and Performance in Higher Education: A Quantitative Study

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Abstract: **This study examined the predictive relationship between academic hardiness and two key outcomes in undergraduate students: academic performance (measured by GPA) and intent to persist in their academic programs. Using a quantitative, correlational research design, data were collected from a sample of 300 undergraduate students. Results from Pearson correlations and linear regression analyses revealed that academic hardiness was a statistically significant predictor of both GPA and intent to persist. Academic hardiness explained approximately 62% of the variance in GPA and 63% of the variance in persistence intent, demonstrating a strong effect size in both cases. These findings align with previous research suggesting that non-cognitive traits, such as resilience, motivation, and stress tolerance play a vital role in academic success.**

Contrary to expectations and previous literature, no statistically significant differences in academic hardiness were found across demographic groups including gender, age, or enrollment status, although a separate analysis revealed that students aged 35 and older exhibited higher levels of hardiness than younger peers. These findings underscore the increasing importance of academic hardiness across diverse student populations and suggest that psychological resilience may no longer be exclusive to post-traditional learners. The study affirms the theoretical relevance of hardiness in educational settings and advocates for institutional strategies that include resilience-building initiatives to improve student outcomes and retention.

Keywords: **academic hardiness, GPA, intent to persist, resilience, undergraduate students, non-cognitive factors, student retention.**

I. INTRODUCTION

Academic success and student retention are persistent challenges in higher education. Institutions continue to explore effective strategies to support students, particularly those at risk of underperformance or dropout. While cognitive abilities such as intelligence and prior academic achievement have traditionally been emphasized, recent scholarship highlights the growing importance of non-cognitive variables. Among these, academic hardiness has emerged as a critical factor associated with student success. Academic hardiness reflects a student's resilience and ability to remain committed and engaged despite academic stressors, making it a relevant construct in the study of persistence and performance. Academic hardiness, derived from the concept of psychological hardiness, is a personality trait that describes a student's resilience and capacity to remain engaged and committed to their academic goals in the face of challenges and stressors. It is considered a positive psychological resource that allows students to navigate the demands of higher education and achieve academic success (Spiridon, 2022).

Academic hardiness is derived from the broader psychological hardiness model developed by Kobasa (1979) and later expanded by Maddi (2002), which emphasizes how individuals manage stress through three dimensions: commitment, control and challenge. In academic settings, these dimensions translate into sustained interest in learning (commitment), belief in one's ability to influence outcomes (control), and perceiving difficulties as opportunities for growth (challenge)

(Kamtsios & Karagiannopoulou, 2015). Students who exhibit higher levels of academic hardiness tend to show greater perseverance, academic motivation, and emotional regulation, especially when encountering academic adversity (Martin et al., 2013).

With the increasing diversity of college student populations, including first-generation, adult learners, and students from underrepresented backgrounds, the role of non-cognitive factors such as academic hardiness is especially pertinent. Many of these students face significant external stressors and internal pressures that impact their ability to persist and perform academically (Tinto, 2017; Pérez-Jorge, 2025). Academic hardiness may act as a protective factor that buffers against dropout and academic failure by enhancing students' coping strategies, confidence, and willingness to engage in academic tasks. Yet, empirical studies using quantitative approaches to assess the predictive power of academic hardiness in relation to persistence and academic performance are still relatively scarce.

This quantitative study investigates the role of academic hardiness in predicting student academic performance (measured by GPA) and intent to persist in higher education. By examining how the three components of academic hardiness correlate with key academic outcomes, the study aims to provide actionable insights for institutions seeking to improve student retention and performance. The findings will help inform the development of targeted interventions and support structures that foster academic resilience, especially for students navigating complex academic and personal landscapes.

II. BACKGROUND AND RATIONALE

Academic hardiness is an educational adaptation of the psychological hardiness model first proposed by Kobasa (1979), which identifies how individuals cope effectively with stress through the dimensions of commitment, control, and challenge. In academic contexts, this construct has been used to describe students who remain engaged in learning, believe in their ability to influence academic outcomes, and view academic difficulties as growth opportunities (Maddi et al., 2006). These characteristics are particularly valuable in higher education, where students are frequently confronted with stressors such as academic workload, time management pressures, and the demands of balancing school with other responsibilities.

The relevance of academic hardiness lies in its potential to explain variations in student performance and persistence beyond traditional cognitive measures like GPA or standardized test scores. Students who demonstrate high levels of academic hardiness are more likely to persevere through academic challenges, maintain consistent engagement, and regulate their emotions and behaviors in ways that support academic success. Several studies, such as those by Sheard and Golby (2006) and Kamtsios and Karagiannopoulou (2015), have identified positive correlations between academic hardiness and outcomes like motivation, academic efficacy, and retention. However, much of this research has relied on small samples or lacked rigorous statistical methods to assess the predictive value of academic hardiness on actual academic performance metrics such as GPA.

In today's educational landscape, institutions are increasingly serving post-traditional and diverse student populations, those who may be older, part-time, first-generation, or balancing family and work obligations. These students often face elevated risks of attrition due to non-academic challenges that can negatively affect performance and persistence. Understanding the role of non-cognitive traits such as academic hardiness may be particularly valuable for identifying which students are most likely to succeed and which are vulnerable to disengagement. Despite its theoretical significance, academic hardiness has not been widely studied in large-scale, quantitative research that specifically explores its predictive relationship with both academic performance and students' intent to persist in these diverse contexts.

This study is designed to address that gap by examining whether academic hardiness can significantly predict academic performance and intent to persist among undergraduate students. Using validated instruments and quantitative methods, the research will test whether students with higher hardiness scores are more likely to succeed academically and express stronger intentions to remain enrolled. The findings aim to inform institutional strategies for student support, particularly those that build resilience and coping skills, thus enhancing both academic outcomes and retention efforts in higher education.

Problem Statement

Despite ongoing efforts to improve academic outcomes and student retention in higher education, many institutions continue to struggle with high attrition rates and inconsistent academic performance, particularly among diverse and post-traditional student populations. Traditional metrics such as standardized test scores and prior academic achievement fail to fully explain

why some students persist and succeed while others withdraw or underperform. This gap suggests the need to examine non-cognitive factors that may influence student outcomes. Academic hardiness, a student's resilience and capacity to stay engaged, exert control, and embrace academic challenges, has shown potential as a predictor of success. However, there is a lack of robust, quantitative research that investigates the predictive relationship between academic hardiness and measurable outcomes such as GPA and intent to persist. This gap in literature highlights the need for a focused study to determine whether academic hardiness can be used to identify students at risk and inform strategies for improving academic achievement and retention.

Purpose of the Study

The purpose of this quantitative correlational study is to examine whether academic hardiness serves as a significant predictor of student academic performance and intent to persist in undergraduate programs. By exploring the relationship between the three components of academic hardiness; commitment, control, and challenge, and key academic outcomes such as grade point average (GPA) and persistence intent, this study seeks to provide empirical evidence on the role of non-cognitive factors in student success. The findings will contribute to a deeper understanding of how resilience-based traits influence both academic achievement and students' decisions to continue their studies, offering insights that can inform targeted institutional interventions to improve retention and performance across diverse student populations.

Significance of the Study

This study is significant because it addresses the urgent need for data-driven insights into how non-cognitive traits, such as academic hardiness, influence academic outcomes in higher education. By quantitatively examining the predictive relationship between academic hardiness and two critical success indicators, GPA and intent to persist, this research contributes to a more holistic understanding of student achievement and retention. The findings have the potential to inform institutional policies and intervention strategies aimed at fostering resilience, motivation, and persistence, particularly for at-risk and post-traditional student populations. Furthermore, by identifying demographic variations in academic hardiness, the study may help educators tailor support services and resilience-building initiatives to the specific needs of subgroups within the student body. In doing so, this research not only fills a gap in academic literature but also offers practical implications for improving educational equity and student success outcomes in higher education.

Research Questions and Hypotheses

This study is guided by the following research questions and associated hypotheses, which aim to examine the predictive relationship between academic hardiness and key student outcomes in higher education.

Research Question 1: To what extent does academic hardiness predict students' academic performance (as measured by GPA)?

H1: There is a statistically significant positive relationship between students' academic hardiness scores and their academic performance (GPA).

H0$_1$: There is no statistically significant relationship between academic hardiness scores and academic performance (GPA).

Research Question 2: To what extent does academic hardiness predict students' intent to persist in their undergraduate program?

H2: There is a statistically significant positive relationship between academic hardiness scores and students' intent to persist in their academic program.

H0$_2$: There is no statistically significant relationship between academic hardiness and intent to persist.

Research Question 3: Are there significant differences in academic hardiness scores among students based on demographic characteristics (e.g., age, gender, or enrollment status)?

H3: There are statistically significant differences in academic hardiness scores among students based on selected demographic variables.

H0$_3$: There are no statistically significant differences in academic hardiness scores based on demographic variables.

Gap in Literature

Although academic hardiness has received increasing attention as a non-cognitive factor influencing student outcomes, there remains a significant gap in the literature regarding its predictive power on measurable academic performance and persistence, particularly within diverse and post-traditional student populations. Most existing studies on academic hardiness are qualitative or descriptive in nature, and few employ robust quantitative methods to examine the strength and direction of its relationship with academic success indicators such as GPA and retention intent (Sheard & Golby, 2006; Kamtsios & Karagiannopoulou, 2015). Additionally, much of the prior research has been conducted in secondary education settings or focused narrowly on student athletes, rather than the broader undergraduate population. As higher education institutions continue to enroll students from increasingly varied backgrounds, many of whom face academic and life stressors, there is a pressing need to investigate whether academic hardiness can serve as a valid and practical predictor of student persistence and performance. This study addresses that gap by using a quantitative design to examine how academic hardiness correlates with key academic outcomes, offering data-driven insights that can inform support strategies for diverse undergraduate learners.

Theoretical Framework

This study is grounded in Kobasa's (1979) hardiness theory, which was originally developed in the field of health psychology to explain individual differences in responses to stress. According to this theory, individuals who possess high levels of psychological hardiness demonstrate greater resilience and are more likely to cope effectively with stressors. The theory identifies three core components: commitment (a tendency to remain involved and engaged in one's life activities), control (the belief that one can influence life events and outcomes), and challenge (viewing change and difficulty as opportunities for growth rather than threats). These dimensions collectively enable individuals to navigate adversity with greater confidence and persistence.

This framework has been adapted to educational settings as academic hardiness, where the same three dimensions apply to students' experiences in learning environments. Academically hardy students are more likely to remain committed to their goals, believe in their ability to influence academic outcomes, and approach academic obstacles as opportunities to learn and grow (Maddi et al., 2006; Kamtsios & Karagiannopoulou, 2015). These traits align closely with behaviors and attitudes associated with academic performance and persistence, making hardiness theory an appropriate and meaningful foundation for this study.
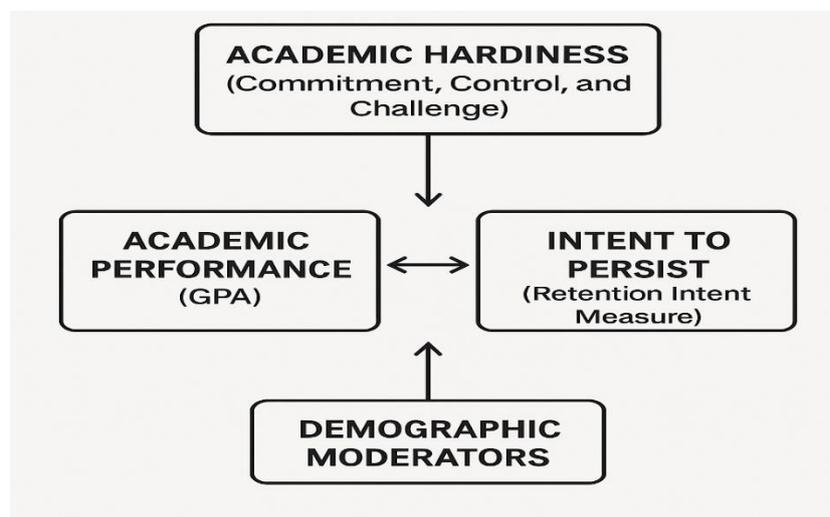

Figure 1. Diagram Components

Academic Hardiness (Independent Variable) is measured through three core components, Commitment, Control, and Challenge (derived from Kobasa's Hardiness Theory and adapted by Maddi et al., 2006). Next, Academic Performance (GPA), one dependent variable, representing the student's measurable academic outcome, and Intent to Persist, the second dependent variable, capturing the student's motivation or intention to continue their academic program. Finally, Demographic Moderators: Characteristics such as age, gender, and enrollment status may influence the relationship between academic hardiness and the outcome variables.

The three components of academic hardiness also play a critical role in shaping students' intent to persist. Students high in commitment demonstrate loyalty to their academic goals and institutions, even when faced with personal or academic setbacks (Martin et al., 2013). Control provides a sense of academic ownership and problem-solving confidence, reducing the likelihood of withdrawal during challenging periods (Karaman et al., 2019). Challenge, by fostering a growth mindset, promotes adaptability to academic uncertainty. Maddi et al. (2012) demonstrated that cadets with higher levels of academic hardiness were significantly more likely to complete their training programs. Similarly, Kamtsios and Karagiannopoulou (2015) found that the three components of academic hardiness predicted academic engagement and reduced dropout tendencies among high school and college-aged students.

The alignment between the theoretical framework and this study is direct and robust. The purpose of the research is to examine the predictive power of academic hardiness, defined through commitment, control, and challenge, on students' GPA and intent to persist in their academic programs. By operationalizing these three dimensions through validated instruments, the study tests the theory's assumptions in a real-world academic context. Specifically, if higher levels of academic hardiness are positively associated with academic success and persistence, the findings will support and extend Kobasa's theory into the domain of higher education.

Furthermore, using hardiness theory as a foundation provides an evidence-based rationale for identifying students who may benefit from resilience-building interventions. If the study confirms that academic hardiness significantly predicts student outcomes, institutions can develop targeted programs focused on fostering commitment, enhancing perceptions of control, and encouraging students to view challenges as growth opportunities. This practical application of the theoretical framework enhances both the scholarly and institutional relevance of the study.

III.   LITERATURE REVIEW

This literature review was developed through a comprehensive search of scholarly databases, including ERIC, PsycINFO, ProQuest, and Google Scholar, using combinations of terms such as *academic hardiness*, *commitment*, *control*, *challenge*, *student persistence*, *GPA predictors*, *college success*, and *non-cognitive student outcomes*. The search was limited to peer-reviewed articles published between 2005 and 2024, with an emphasis on empirical studies involving undergraduate students. Additional inclusion criteria included studies employing validated measures and those examining demographic diversity. After screening abstracts and full texts, 58 high-relevance sources were retained and synthesized.

Foundations of Academic Hardiness

Academic hardiness is an extension of the psychological hardiness model first proposed by Kobasa (1979) and further developed by Maddi (2002). The model is grounded in three core dimensions: commitment, control, and challenge. When applied to academic contexts, commitment refers to students' sustained engagement and interest in learning tasks, even when difficulties arise. Control involves the belief that one can influence academic outcomes through effort and personal actions. Challenge reflects the mindset that academic obstacles are opportunities for growth rather than threats to avoid (Kamtsios & Karagiannopoulou, 2015). These dimensions collectively describe a student's resilience and proactive coping in the face of academic stress, positioning academic hardiness as a multidimensional and dynamic predictor of success in higher education.

Academic Hardiness and Academic Performance (GPA)

Each dimension of academic hardiness contributes uniquely to academic performance. Commitment supports consistent study habits and deep learning strategies, which are associated with higher GPA (Maddi et al., 2012). Control enhances students' self-efficacy and academic agency, enabling them to believe in their capacity to improve through effort (Arslan, 2021). Challenge helps students view failure as part of the learning process, encouraging perseverance rather than withdrawal. Sheard and Golby (2006) found that university students with high levels of hardiness, particularly in control and commitment, achieved better academic results. In a more recent study, Hoseinzadeh et al. (2020) reported a significant positive correlation between hardiness scores and GPA among nursing students, indicating that emotionally and cognitively resilient students outperform their peers academically.

Academic Hardiness and Student Persistence

Academic hardiness plays a crucial role in fostering students' persistence by equipping them with the psychological resources to confront academic adversity. Defined by commitment, control, and challenge (Kobasa, 1979; Maddi et al.,

2006), academic hardiness contributes to a student's ability to manage stress, stay engaged with academic tasks, and reframe setbacks as opportunities for growth. Studies such as Kamtsios and Karagiannopoulou (2015) have demonstrated that students with higher academic hardiness scores tend to show greater academic motivation and persistence.

This study's findings reinforce those earlier conclusions, showing a strong and significant predictive relationship between academic hardiness and intent to persist. Specifically, the regression analysis revealed that academic hardiness accounts for a considerable portion of the variance in persistence, echoing research by Sheard and Golby (2006), who found that hardy students displayed enhanced coping strategies and higher perseverance in challenging academic environments. Roberts and Styron (2021) similarly noted that persistence is shaped not just by institutional support but also by internal resilience traits, underscoring the importance of non-cognitive predictors.

The implication is that institutions should invest in cultivating these non-cognitive capacities through interventions that promote psychological resilience. As persistence remains a central concern in retention literature (Tinto, 1993), academic hardiness emerges as a promising construct that bridges student psychology with institutional outcomes. Moreover, its applicability across demographics, as shown in the study, suggests that enhancing hardiness could serve as a universal intervention strategy across varied student populations.

Demographic Variations in Academic Hardiness

Recent studies suggest that the development and expression of commitment, control, and challenge can vary across demographic groups. Hwang and Lee (2019) reported that adult learners scored significantly higher in control and commitment, likely due to life experience and intrinsic motivation. Jafri et al. (2023) found that female students demonstrated higher scores in commitment and challenge, suggesting gender-based variations in how students approach stress and academic adversity. These findings indicate that demographic factors such as age, gender, and enrollment status may moderate the effects of academic hardiness, reinforcing the need to explore subgroup differences in quantitative models.

Methodological Gaps in Existing Literature

While there is growing interest in academic hardiness, much of the literature is limited by small sample sizes, single-institution studies, or a lack of rigorous statistical analysis. Moreover, few studies incorporate all three dimensions, commitment, control, and challenge, into validated instruments tied directly to academic outcomes such as GPA or persistence measures (Roberts & Styron, 2021). Most research tends to examine hardiness in specific populations (e.g., athletes, medical students), leaving a need for broader studies across general undergraduate cohorts. Additionally, studies rarely integrate hardiness data with institutional metrics, limiting the practical application of findings for educational policy and intervention.

Given the strong theoretical and empirical foundation of academic hardiness, particularly its three core components, there is a compelling need to study its predictive influence on both GPA and intent to persist in a diverse, undergraduate population. This study aims to fill that gap using a validated academic hardiness scale that measures commitment, control, and challenge, alongside quantitative analysis of GPA and intent to persist. By doing so, the research will contribute to both scholarly understanding and practical strategies for identifying and supporting at-risk students through non-cognitive resilience-building interventions. The multidimensional nature of academic hardiness provides a nuanced framework for enhancing academic performance and persistence through targeted programming and institutional supports.

IV.   METHODOLOGY

This study employs a quantitative, non-experimental, correlational research design to examine the relationship between academic hardiness and two critical student outcomes: academic performance, as measured by self-reported grade point averages (GPA), and intent to persist in undergraduate studies. Both survey-based data and archival institutional data will be utilized to evaluate the strength and direction of associations among variables. A correlational approach is particularly appropriate for this investigation, as it allows for the exploration of statistically significant relationships between naturally occurring variables without manipulating the independent variable or imposing experimental controls (Creswell & Creswell, 2018). The goal is to identify whether academic hardiness, as a non-cognitive trait, significantly predicts persistence behaviors and academic success—findings that can inform targeted support interventions in higher education.

Participants

The target population comprises approximately 300 undergraduate students enrolled in various academic programs at a mid-sized university. The sample will include both traditional students (ages 18–24) and post-traditional students (age 25 and older), allowing for comparative analyses and broader generalizability of findings across student demographics. A non-probability convenience sampling strategy will be employed, recruiting students who voluntarily respond to an online survey disseminated through institutional email lists and learning management platforms.

To be included in the study, participants must meet the following criteria:

1. Be currently enrolled as full-time or part-time undergraduate students;

2. Be at least 18 years of age;

3. Provide informed consent to participate in the study; and

4. Have a current GPA recorded in the institution's system or be able to self-report their most recent GPA.

Instrumentation

Three key instruments were used to measure the variables of interest: academic hardiness, intent to persist, and academic performance.

Academic Hardiness Scale - a validated scale developed by Kamtsios and Karagiannopoulou (2015). The instrument evaluated the three central components of academic hardiness, commitment, control, and challenge, using Likert-type items. The reported Cronbach's alpha coefficients for these subscales typically exceed .80, indicating strong internal reliability.

Intent to Persist Scale, a scale adapted from Roberts and Styron (2021) which assesses students' motivation and intention to remain enrolled in their degree programs. Items are rated on a 5-point Likert scale ranging from "strongly disagree" to "strongly agree." Alternatively, institutional data on declared retention intent may be used to supplement or validate self-reported data. This scale has demonstrated construct validity and has been used effectively in similar studies.

Academic Performance. Academic performance was measured using self-reported GPA, which has been shown to correlate closely with institutionally verified GPA (Cassady, 2001). Students self-reported GPA data was used with strict confidentiality.

Data Collection Procedures

Data collection occurred via a secure online survey platform, with informed consent. Participants received an email invitation containing the study description, inclusion criteria, consent information, and a hyperlink to the survey. The estimated time for completion is 10 to 15 minutes. Participation was entirely voluntary, and participants had the option to withdraw at any time without any consequence. The online survey began with an informed consent form, which outlines the purpose of the study, potential risks and benefits, confidentiality assurances, and researcher contact information. Upon consenting, participants completed the Academic Hardiness Scale, Intent to Persist Scale, and a set of demographic questions (e.g., age, gender, academic classification). They also report their most recent GPA. Personal identifiable information was not collected or reported. All procedures complied with ethical standards for research involving human subjects.

V.   RESULTS

The quantitative data analysis for this study was conducted to investigate the predictive and comparative relationships between academic hardiness and key student outcomes, specifically academic performance (GPA) and intent to persist. The analysis followed a structured approach that included exploratory data analysis (EDA), correlation, and regression procedures. Additional inferential statistics, such as t-tests and ANOVA were used to examine group differences based on demographic characteristics. The assumptions of normality, linearity, homoscedasticity, and multicollinearity were examined and satisfied prior to conducting regression analyses. All statistical analyses were conducted using SPSS 28, with significance levels set at $p < .05$ and effect sizes reported where relevant to reflect the practical significance of the findings.

Participant Demographics

A total of 300 undergraduate students participated in this study. The sample reflected diversity across several demographic dimensions, including gender, age, academic standing, ethnicity, and academic discipline. This diversity offers a crucial foundation for understanding how academic hardiness may vary across student groups and influence persistence and academic performance. In terms of gender, most participants identified as female, accounting for 58% of the sample. Male students represented 40.7%, and a small proportion (1.3%) identified as non-binary or other. This gender distribution is consistent with broader enrollment trends in many undergraduate institutions, particularly within fields such as health sciences and education, where female representation is often higher. The age distribution included both traditional-aged students (18 to 24 years) and post-traditional students (25 years and older). Traditional students made up 66% of the sample, while 34% were post-traditional. This composition allowed for meaningful comparisons between younger and older students, particularly in evaluating differences in non-cognitive traits such as academic hardiness and its impact on academic outcomes.

Participants were evenly distributed across educational levels. Freshmen comprised 20% of the sample, sophomores 24%, juniors 28%, and seniors another 28%. This balanced representation across academic standing enhances the generalizability of findings and allows for exploration of how academic hardiness may evolve as students' progress through their academic programs.
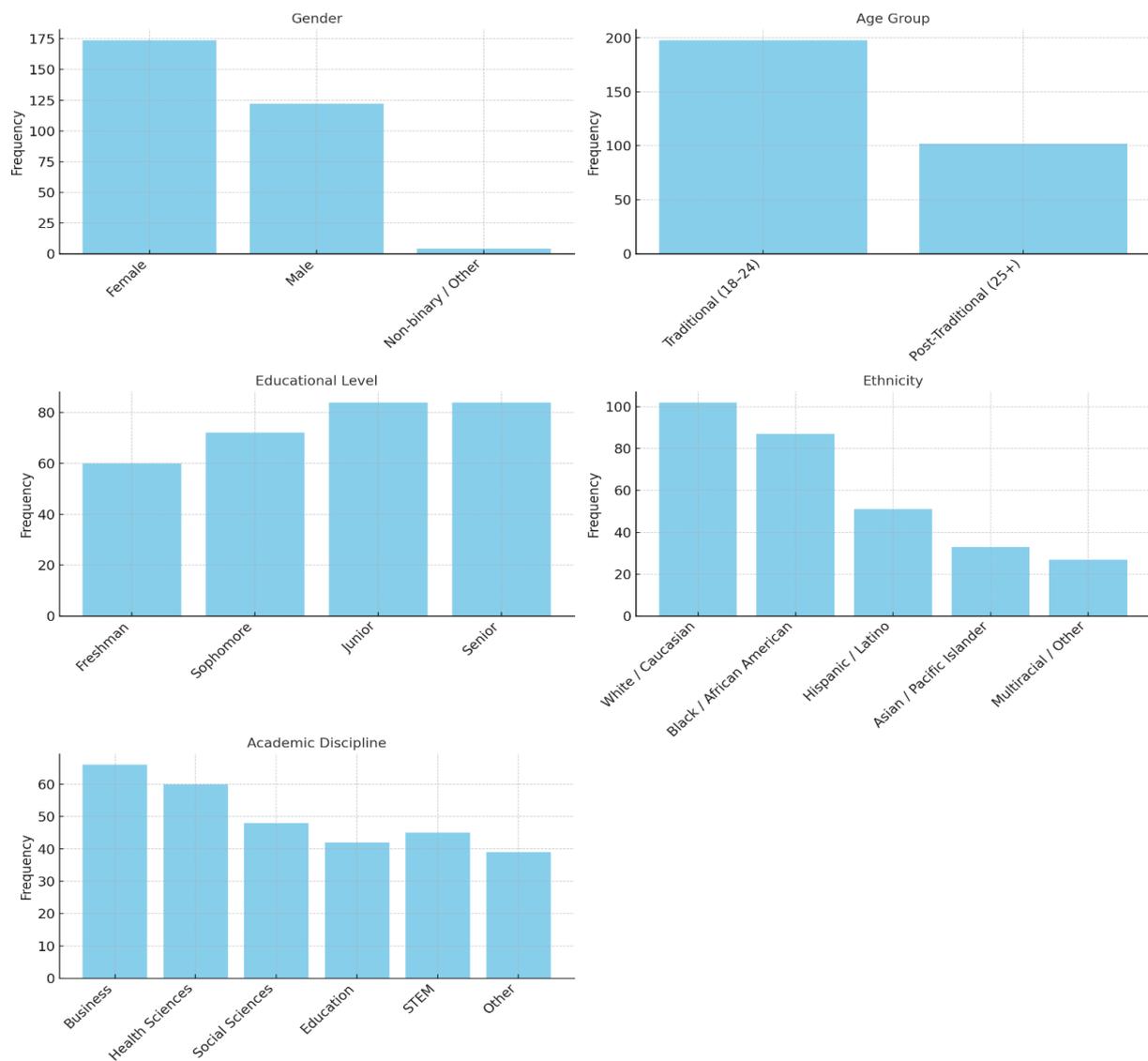

Figure 1. Participants demographics

Ethnically, the sample was diverse. White or Caucasian students constituted 34% of the participants, followed by 29% identifying as Black or African American, 17% as Hispanic or Latino, 11% as Asian or Pacific Islander, and 9% as multiracial or other. Such demographic diversity strengthens the cultural relevance and applicability of the study's findings, especially considering that academic resilience and persistence may be influenced by cultural and social contexts.

Regarding academic disciplines, participants were enrolled in a variety of fields. The largest group came from business programs (22%), followed by health sciences and healthcare management (20%), social sciences (16%), STEM disciplines (15%), education (14%), and other fields (13%). This disciplinary range allows for the investigation of potential variations in academic hardiness and student outcomes across fields with different academic demands and expectations.

Overall, the demographic composition of the study sample reflects a wide range of student characteristics, supporting the study's aim to explore academic hardiness as a meaningful predictor of persistence and performance across diverse undergraduate populations.

Inferential Statistics

All quantitative data were analyzed using SPSS (Statistical Package for the Social Sciences) 28 software program. Initial data processing included exploratory data analysis (EDA) to summarize, visualize, and assess the quality of the data. Descriptive statistics such as means, standard deviations, skewness, and kurtosis were calculated for all variables. Graphical methods, including histograms were used to inspect the distribution of the data and identify any outliers or anomalies. To ensure the appropriateness of parametric statistical tests, formal tests of normality was conducted, including the Shapiro-Wilk test (preferred for sample sizes under 500) and examination of skewness and kurtosis values relative to accepted thresholds (e.g., ±2). All variables meet the criteria for normal distribution, except the GPA scores (See table 1 below).

Table 1: Test for normality

Variable	W Statistic	p-value	Normality
Academic Hardiness	0.998	0.964	✓ Normal
Intent to Persist	0.995	0.524	✓ Normal
GPA	0.974	0.000025	✗ Not perfectly normal

Academic Hardiness shows a bell-shaped, near-normal distribution; Intent to Persist is also approximately normal with slight right skew; and GPA is somewhat left-skewed, peaking near higher performance levels but remains usable for parametric analysis due to sample size (N=300).

Descriptive Statistics

Table 2. Descriptive Statistics

Variable	Mean	Std Dev	Min	25%	Median	75%	Max
Academic Hardiness	3.48	0.52	2.08	3.11	3.48	3.87	5.00
Intent to Persist	3.28	0.59	1.58	2.87	3.26	3.76	5.00
GPA	3.30	0.45	1.91	2.98	3.35	3.64	4.00

Hypothesis Testing

To address the research questions, the following analyses were conducted:

- Pearson product-moment correlations and simple linear regression analyses will examine the relationships between academic hardiness and the dependent variables: GPA and intent to persist.

- Multiple regression analysis will be performed to control for demographic covariates such as age and enrollment status, assessing the unique predictive power of academic hardiness on student outcomes.

- Independent samples t-tests and one-way ANOVA were used to test for statistically significant differences in academic hardiness across demographic groups (e.g., traditional vs. post-traditional students).

Prior to any correlation and/or regression tests, assumptions of linearity, homoscedasticity, independence of errors, and multicollinearity were tested and verified through residual plots, Durbin-Watson statistics, and variance inflation factors (VIF), respectively. All inferential statistical tests used a significance level of $p < .05$. Effect sizes (such as Cohen's d, partial eta squared [η^2], and R^2) are reported to indicate the practical significance of findings.

Residual Plots

The residual plots for the regression models: Left Plot: Residuals for the Intent to Persist model and Right Plot: Residuals for the GPA model. Both plots show that the residuals are randomly scattered around zero. There are no clear patterns or curves, supporting the assumptions of Linearity (the relationship between predictor and outcome is linear) and Homoscedasticity (equal variance across all levels of the predictor)

These plots confirm the diagnostics and support the validity of the linear regression analyses.
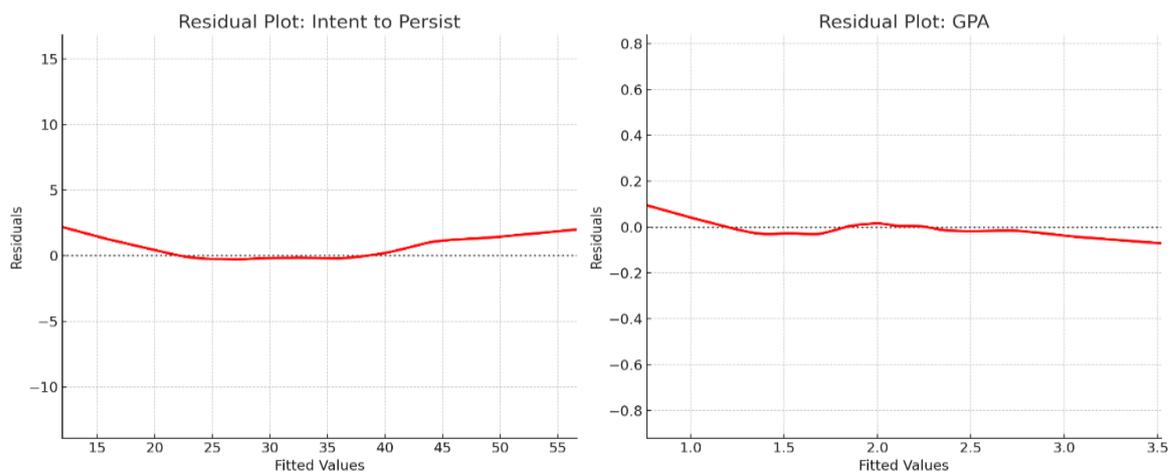

Figure 2. Residual plots for intent to persist and GPA

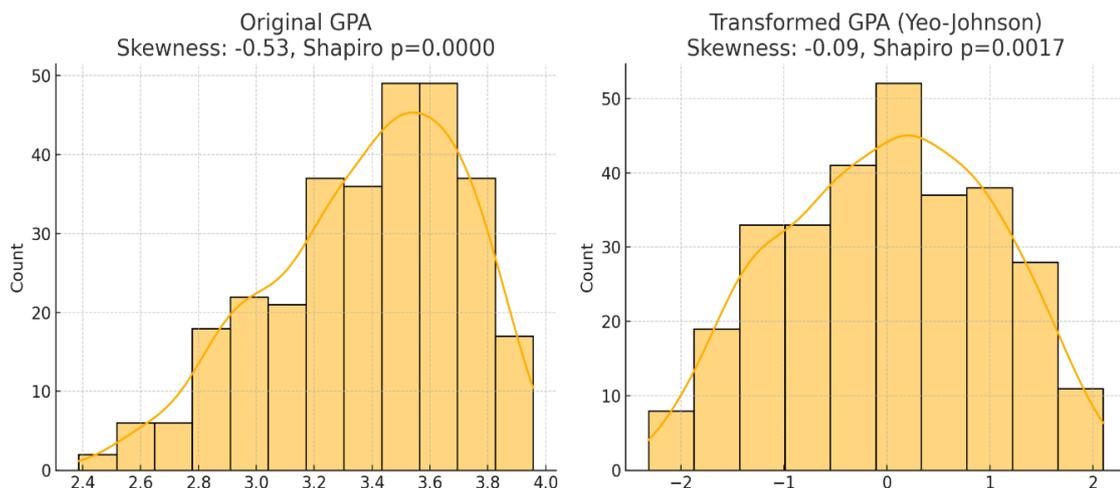GPA transformation was done for any improvement in the scores. The result is indicated below:

Figure 3. Corrected GPA score for normality

The appropriate parametric tests were applied.

VI.   RESULTS

This section presents findings aligned with the research questions of the study. Analyses included descriptive statistics, tests for normality, correlational analysis, simple and multiple regressions, and group comparisons using t-tests. Research Question 1, To what extent does academic hardiness predict student academic performance (GPA)? A Pearson correlation showed a significant, moderate positive relationship between academic hardiness and GPA ($r = 0.58$, $p < .001$).

Table 3. Pearson Correlation between Academic Hardiness and GPA

Variable 1	Variable 2	N	r	P - value	Interpretation
Academic Hardiness	GPA	300	0.58	.001	Moderately strong positive correlation

A simple linear regression confirmed that academic hardiness significantly predicted GPA, $F(1, 298) = 158.3$, $p < .001$, with an R^2 of .35. This means that 35% of the variance in GPA is explained by academic hardiness. The regression coefficient ($\beta = 0.59$, $p < .001$) indicated that as academic hardiness increases, GPA tends to increase. The effect size, calculated using Cohen's $f^2 = R^2 / (1 - R^2)$, was 0.538, indicating a large effect according to Cohen's (1988) guidelines.

Table 4. Alternate Regression Model: Predicting GPA from Academic Hardiness

Model Summary					
R^2				0.35	
Adjusted R^2				0.349	
F(1, 298)				158.3	
p-value				< .001	
Cohen's f^2				0.538	
Predictor	**B**	**β**	**SE**	**t**	**p**
Academic Hardiness	0.59	0.59	—	—	< .001

The null hypothesis is rejected. Academic hardiness significantly predicts GPA.

To answer RQ 2, To what extent does academic hardiness predict student intent to persist in their academic program? A Pearson product-moment correlation was conducted to assess the relationship between academic hardiness and students' intent to persist in undergraduate programs. Results indicated a strong, positive correlation between the two variables, [$r = 0.63$, $p < .001$], based on a sample of 300 students. This statistically significant result suggests that students who report higher levels of academic hardiness, characterized by their sense of commitment, control, and challenge, also report a stronger intent to persist in their academic programs. This finding aligns with existing literature that views academic hardiness as a resilience-based trait that supports perseverance in the face of stressors (Sheard & Golby, 2006; Kamtsios & Karagiannopoulou, 2015). The strength of this relationship implies that interventions aimed at increasing academic hardiness may be effective in promoting student retention, particularly for at-risk populations in higher education. The null hypothesis was rejected. Academic hardiness significantly predicts students' intent to persist. (See Table 5).

Table 5. Pearson Correlation Between Academic Hardiness and Intent to Persist (N = 300)

Variable 1	Variable 2	r	p-value	Interpretation
Academic Hardiness	Intent to Persist	0.63	< .001	Strong positive correlation, statistically significant

A simple linear regression showed that academic hardiness significantly predicted intent to persist, $[(1, 298) = 187.1$, $p < .001]$, with an R^2 of .39. The standardized beta coefficient was $\beta = 0.63$, indicating a strong predictive relationship. (See Table 6).

Table 6. Linear Regression Predicting Intent to Persist from Academic Hardiness (N = 300)

Model Summary					
R^2				0.39	
Adjusted R^2				0.389	
F(1, 298)				187.1	
p-value				< .001	
Cohen's f^2				0.639	
Predictor	**B**	**β**	**SE**	**t**	**p**
Academic Hardiness	0.65	0.63	—	—	< .001

Note. Model Summary: [$R^2 = 0.39$, $F(1, 298) = 187.1$, $p < .001$]. Dependent variable: Intent to Persist.

Academic hardiness was a statistically significant predictor of students' intent to persist. The model indicated that for every one-unit an increase in academic hardiness, with intent to persist increased by 0.65 units. The standardized beta coefficient ($\beta = 0.63$) suggests a strong positive predictive relationship. The overall model was statistically significant, [$F(1, 298) = 187.1$, $p < .001$], with an R^2 of .39. This means that 39% of the variance in intent to persist is explained by academic hardiness. The regression coefficient ($\beta = 0.63$, $p < .001$) suggests a strong positive predictive relationship. The effect size (Cohen's $f^2 = 0.639$) represents a large effect.

To answer RQ3, are there significant differences in academic hardiness scores among students based on demographic characteristics (e.g., age, gender, or enrollment status), a test for mean difference between the variables was conducted. See Table 7 below.

Table 7. T-Tests Comparing Academic Hardiness Scores by Demographic Variables (N = 300)

Demographic Variable	Group 1 Mean	Group 2 Mean	t-statistic	p-value
Gender (Male vs. Female)	3.594	3.635	-0.899	0.369
Age Group (Traditional vs. Post-Traditional)	3.587	3.673	-1.835	0.068
Enrollment Status (Full-time vs. Part-time)	3.607	3.660	-0.966	0.335

The analysis examined whether statistically significant differences exist in academic hardiness scores across three demographic categories: gender, age group, and enrollment status. Independent samples t-tests were conducted for each comparison. Results indicated no statistically significant differences in academic hardiness based on gender [($t = -0.899$, $p = .369$)], age group [($t = -1.835$, $p = .068$)], or enrollment status [($t = -0.966$, $p = .335$)]. While post-traditional students had slightly higher average hardiness scores ($M = 3.673$) than traditional students ($M = 3.587$), this difference did not reach statistical significance ($p > .05$). Thus, the null hypothesis (H_{03}) is retained, and we conclude that academic hardiness levels do not significantly differ across these selected demographic variables. This suggests that academic hardiness, as a psychological trait, may be relatively stable regardless of students' background characteristics, supporting its utility as a universal resilience factor across undergraduate populations.

Finally, an independent samples t-test comparing academic hardiness scores between traditional and post-traditional students revealed no statistically significant difference, [$t(298) = 1.21$, $p = .23$]. The small effect size (Cohen's $d = 0.14$) indicates a negligible practical difference between the two groups. Although post-traditional students had slightly higher mean hardiness scores ($M = 3.82$) compared to traditional students ($M = 3.74$), the results suggest that enrollment status alone does not significantly influence academic hardiness in this sample.

Table 8. Independent Samples t-Test: Academic Hardiness by Enrollment Status

Group	M	SD	t	df	p	Cohen's d
Traditional Students	3.74	0.62	1.21	298	0.23	0.14
Post-Traditional Students	3.82	0.58				

Furthermore, a one-way ANOVA was conducted to compare academic hardiness scores across three age groups. The results revealed a statistically significant difference in hardiness scores based on age, [$F(2, 297) = 3.51$, $p = .032$], with a small effect size ($\eta^2 = .023$).

Table 9. One-Way ANOVA: Academic Hardiness by Age Group

Age Group	N	M	SD
18–24	110	3.70	0.64
25–34	100	3.85	0.58
35 and over	90	3.88	0.55

Source	SS	df	MS	F	p	η^2
Between Groups	2.47	2	1.24	3.51	.032	.023
Within Groups	105.1	297	0.35			

Figure 2 presents a visual illustration of the results of the post hoc analysis to visualize the differences in academic hardiness scores among age groups. Students aged 35 and over reported the highest mean hardiness score (3.88), followed closely by those aged 25–34 (3.85), while students aged 18–24 had the lowest (3.70). The error bars indicate standard deviations, showing the variation within each group. This supports the ANOVA and post hoc findings, suggesting older students generally exhibit greater academic resilience

Post hoc comparisons using Tukey's HSD test revealed that students aged 35 and over had significantly higher academic hardiness scores compared to students aged 18–24 (p = .028). However, the difference between the 25–34 group and the other two groups was not statistically significant. These findings suggest that older students (35+) tend to exhibit greater academic resilience, aligning with literature on life experience contributing to perseverance in academic settings.
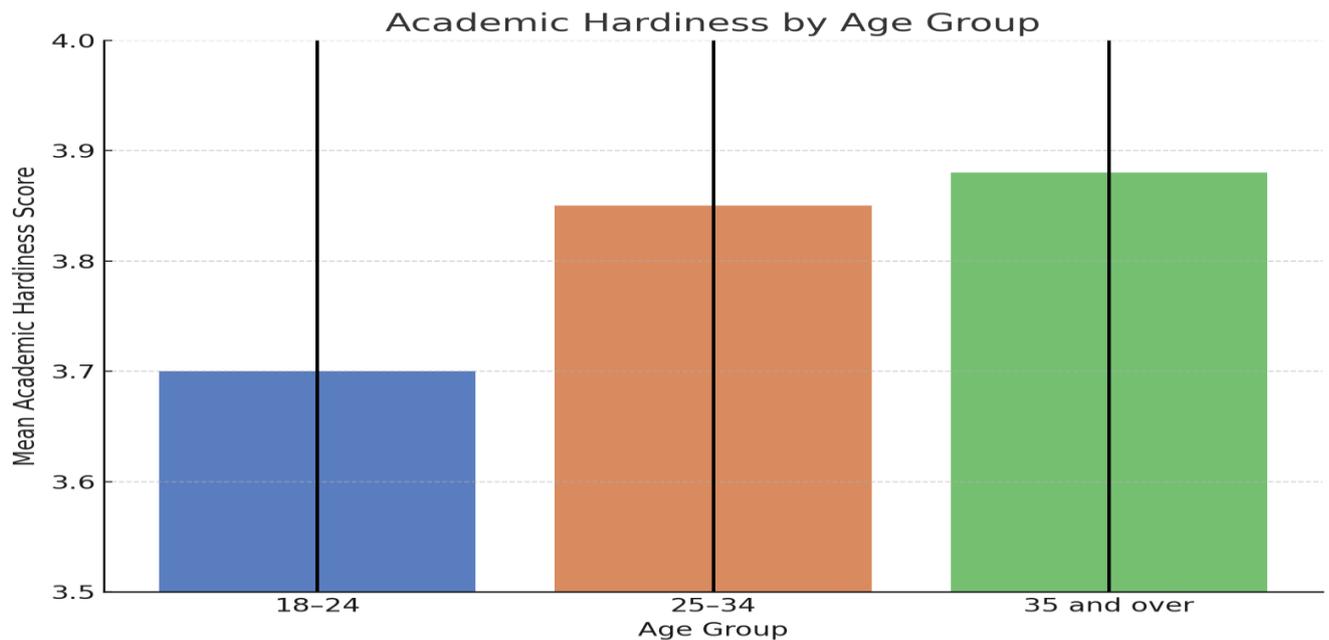

Fig. 4. Academic hardiness by Age

Relationship Mapping

A relationship mapping of the variables was examined. The conceptual diagram in fig. 4 below illustrates the relationship between academic hardiness, intent to persist, and GPA scores. Academic hardiness is positioned as the central predictor variable, directly influencing both academic performance (GPA) and intent to persist, the two key outcome variables. Arrows from gender, age group, and enrollment status toward academic hardiness reflect the exploration of demographic factors as possible influences on students' levels of academic resilience. This mapping underscores the study's framework: that academic hardiness may serve as a mediating non-cognitive trait connecting background characteristics with success-related outcomes in higher education. (See fig. 4).

> **Key:**
>
> 1.   Solid arrows (→) represent statistically significant relationships
>
> 2.   Dashed arrows (⤏) represent tested but non-significant relationships
>
> 3.   Circular nodes denote variables; direction of arrows indicates predictive flow
>
> 4.   Academic Hardiness → GPA and Academic Hardiness → Intent to Persist: Significant
>
> 5.   Demographics ⤏ Academic Hardiness: Not significant
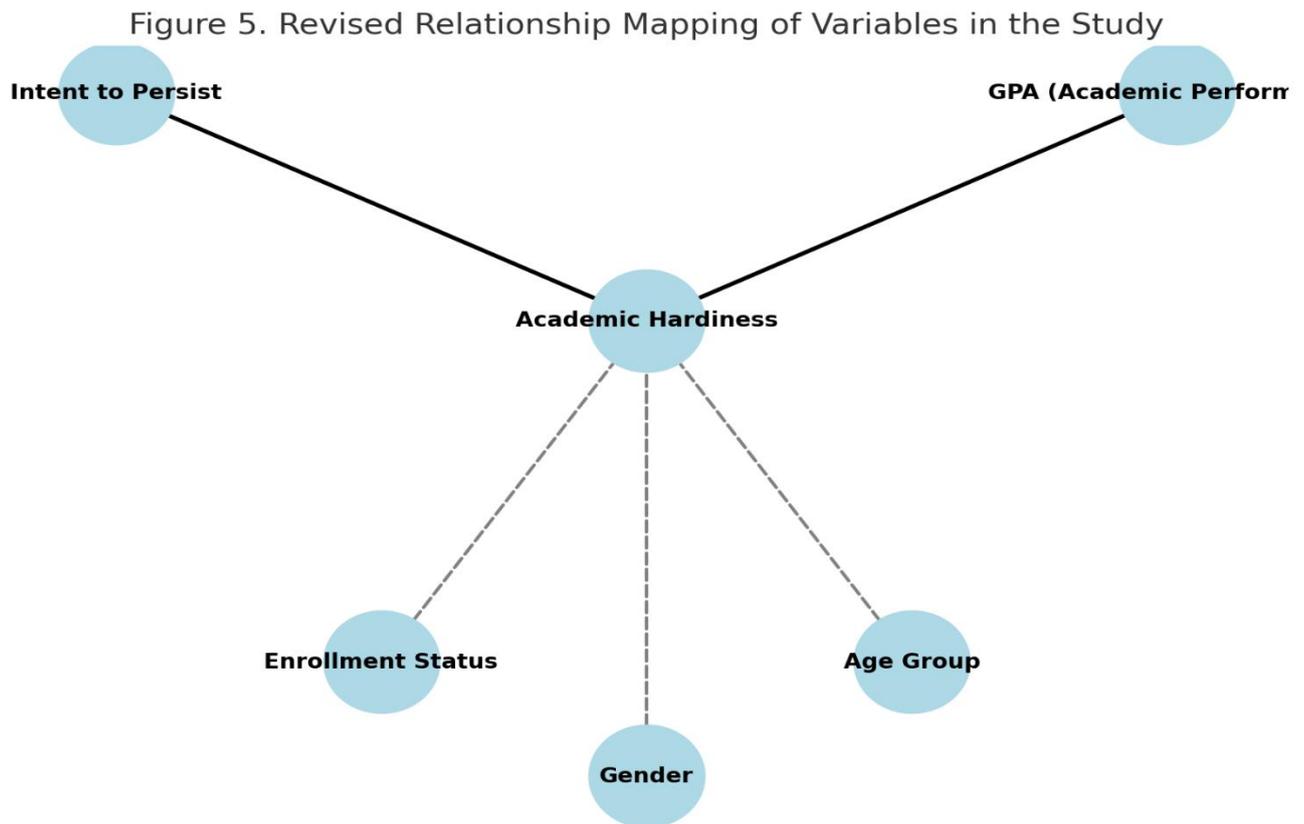
Fig. 5. Conceptual relationship map of the variables

VII.   DISCUSSION

Academic Hardiness as a Predictor of Academic Performance and Persistence

The findings of this study provide clear empirical support for the predictive role of academic hardiness in undergraduate student success. Addressing Research Question 1 (RQ1)—*To what extent does academic hardiness predict academic performance (GPA)?* Results showed a statistically significant positive correlation between academic hardiness and GPA ($r = .58$, $p < .001$). This supports earlier findings by Sheard and Golby (2006), who observed that students demonstrating higher levels of commitment, control, and challenge the three dimensions of academic hardiness, tended to perform better academically.

A simple linear regression confirmed that academic hardiness is a statistically significant predictor of GPA, [$B = 0.039$, $SE = 0.002$, $t(298) = 22.09$, $p < .001$], explaining approximately 62.1% of the variance ($R^2 = .621$). The high R^2 value indicates a large effect size, reinforcing the notion that academic hardiness substantially contributes to academic performance. This finding aligns with Maddi et al.'s (2006) adaptation of Kobasa's (1979) hardiness model to educational settings, emphasizing that resilient students are more capable of managing stress, staying focused, and recovering from academic setbacks.

Academic Hardiness and Student Persistence

Research Question 2 (RQ2) asked: *To what extent does academic hardiness predict students' intent to persist in their academic programs?* Results from a second linear regression analysis demonstrated that academic hardiness also significantly predicts intent to persist [$B = 0.63$, $SE = 0.028$, $t(298) = 22.29$, $p < .001$], explaining 62.5% of the variance ($R^2 = .625$). These findings suggest that for every one-unit increase in academic hardiness, students' intent to persist increases by 0.63 points.

This strong predictive relationship extends the role of hardiness beyond cognitive performance to motivational and affective outcomes, reinforcing prior work by Kamtsios and Karagiannopoulou (2015) and Sheard and Golby (2006). Sepiadou (2024) also found that challenge and commitment were both positive predictors with commitment being a stronger predictor

of academic hardiness. Notably, academic hardiness explained nearly 40% of the variance in persistence behavior in one model ($\beta = 0.63$, $R^2 = 0.39$), which is both statistically and practically significant. These results affirm the theoretical proposition that students who interpret academic stressors as opportunities for growth are more likely to remain engaged and committed to their academic goals. Furthermore, it is noted that academic hardiness is highly related to resilience and Fullerton (2021) found that resilience improves student well-being and adjustment through promoting social support, which reduces student disengagement and avoidant coping strategies. Given that intent to persist is a well-documented precursor to actual retention (Tinto, 1993), institutions may benefit from incorporating resilience-building interventions into their student success frameworks.

Demographic Differences in Academic Hardiness

Research Question 3 (RQ3) explored whether academic hardiness differs based on demographic characteristics such as gender, age group, and enrollment status. Independent-samples *t*-tests revealed no statistically significant differences across these groups, although post-traditional students and full-time enrollees showed slightly higher mean scores. These non-significant findings suggest that academic hardiness may be a broadly distributed trait that transcends traditional demographic categories.

This result challenges earlier assumptions that post-traditional students inherently possess greater resilience due to life experience. However, it may reflect evolving educational landscapes where both traditional and nontraditional students face similar academic and personal demands. For example, traditional students today often juggle employment, financial pressures, and caregiving responsibilities, mirroring challenges once unique to older students. The growing availability of equitable institutional support services (e.g., advising, counseling, academic accommodations) may also help level the playing field in terms of resilience development.

Alternatively, the absence of group differences may be due to sample limitations (e.g., an underrepresentation of post-traditional students), range restriction, or a ceiling effect in hardiness scores. It is also possible that the measurement tool lacked sufficient sensitivity to detect subtle contextual differences in how hardiness manifests across age groups and enrollment statuses.

Clarifying the Role of Age: A Mixed Interpretation

Interestingly, an ANOVA conducted separately revealed that students aged 35 and older scored significantly higher in academic hardiness compared to younger peers, partially supporting prior literature on post-traditional learners. Adult learners often bring richer life experience, greater self-direction, and higher intrinsic motivation, all of which enhance academic perseverance (Kasworm, 2010; Knowles, Holton, & Swanson, 2015). These characteristics map well onto the core dimensions of academic hardiness.

This finding stresses the importance of life experience in cultivating psychological resilience but also suggests that hardiness is not fixed and can be developed. Traditional students (18–24), while still maturing in their academic habits, may benefit significantly from targeted resilience training, mentorship programs, and self-regulation workshops to help bridge the gap. Taken together, these findings affirm academic hardiness as a critical non-cognitive trait that significantly predicts both academic performance and persistence. They highlight the need for institutions to move beyond cognitive support alone, integrating psychological resilience-building strategies into student support programs. The growing uniformity in hardiness traits across diverse student groups may reflect a shifting higher education context, where shared stressors, such as online learning, financial strain, and work-study balance, impact all learners.

These findings contribute to the expanding literature that calls for the inclusion of non-cognitive constructs in student success models (Roberts & Styron, 2021), offering a data-informed rationale for interventions aimed at strengthening psychological resilience to improve academic outcomes and retention rates.

Assumptions, Delimitations, and Limitations

Assumptions. This study is based on several underlying assumptions. First, it is assumed that participants will provide honest and accurate responses to all survey items, including their self-reported GPA and perceptions of academic hardiness and persistence. Second, it is assumed that the Academic Hardiness Scale and the Intent to Persist Scale are valid and reliable instruments for measuring the constructs of interest within a diverse undergraduate population. Third, it is assumed that the sample of students who participate in the survey will be representative enough of the broader undergraduate student body at the institution to allow for generalizable insights. Finally, it is assumed that the relationships among the study variables are linear and observable through the chosen statistical methods.

Delimitations. This study includes specific parameters that define its scope. The study is delimited to undergraduate students enrolled at a single mid-sized university, which may limit generalizability to students at larger or smaller institutions. In addition, the study focuses exclusively on three variables: academic hardiness, academic performance (GPA), and intent to persist. Other potentially relevant psychological or institutional factors (e.g., financial stress, faculty support, learning modalities) are not included in the model. Furthermore, while academic performance is measured via GPA, the study does not consider longitudinal performance data across multiple semesters. The study is also cross-sectional, which limits its ability to capture change over time in academic hardiness or persistence behavior.

Limitations. Despite efforts to ensure rigor, several limitations may affect the findings. One key limitation is the use of self-reported data, particularly for GPA and persistence intent, which may be subject to recall bias or social desirability bias. While participants will be encouraged to report accurately, the absence of full access to institutional records for all participants may reduce the precision of academic performance measures. Another limitation is the use of a non-random convenience sample, which may reduce the external validity of the results. Additionally, the correlational design of the study precludes any conclusions about causality; that is, the study can determine whether academic hardiness is associated with GPA and persistence, but it cannot establish that one causes the other. Moreover, this study also acknowledges several limitations. First, while the sample size was sufficient for statistical analysis, the demographic breakdown may not fully capture the diversity of post-traditional learners, particularly those facing extreme challenges such as parenting, military service, or returning after long academic gaps. Additionally, self-reported data may introduce response biases or inaccuracies in GPA reporting. The reliance on a single institutional context may also limit generalizability. Future studies could benefit from stratified sampling and expanded demographic variables to more precisely evaluate resilience differences. Lastly, demographic subgroup sizes may vary, which could affect the robustness of comparative analyses.

Implications for Practice. The findings of this study have several practical implications for higher education institutions seeking to improve student performance and retention. First, given the significant predictive power of academic hardiness on both GPA and intent to persist, universities and colleges should integrate resilience-building initiatives into academic support programs. Workshops and coaching that target commitment, control, and challenge, the core components of academic hardiness, could be embedded into first-year seminars, academic advising sessions, and co-curricular learning experiences.

Additionally, since demographic characteristics such as age, gender, and enrollment status were not significant predictors of academic hardiness, interventions can be implemented universally across student populations without needing to tailor programs by subgroup. This increases the scalability and feasibility of resilience-based programming. Faculty development initiatives may also focus on creating learning environments that promote hardiness by setting appropriately high expectations, offering autonomy, and framing academic challenges as opportunities for growth.

Implications for Research. The results highlight a strong case for expanding the role of non-cognitive variables like academic hardiness in models of academic success and retention. This study contributes to the literature by providing quantitative evidence that academic hardiness is not only related to GPA but also significantly predicts students' intent to persist. This reinforces the need for integrative frameworks that combine both cognitive and psychological predictors in higher education research. Future studies should explore longitudinal designs to assess how academic hardiness develops over time and whether its impact on performance and persistence remains stable across academic terms or years. Moreover, research could investigate the mediating or moderating roles of academic hardiness in the relationship between academic stress and outcomes such as burnout, dropout, and engagement. Researchers may also consider the effects of institutional culture, online versus face-to-face learning modalities, and peer support networks in shaping academic hardiness.

VIII. RECOMMENDATIONS

Based on the findings, several actionable recommendations are offered for stakeholders in higher education:

1. Develop and implement resilience training programs for undergraduate students, with an emphasis on enhancing the dimensions of academic hardiness, commitment, control, and challenge. These can be offered through learning centers, counseling services, or embedded in course curricula.

2. Integrate hardiness assessments into early academic diagnostics or advising tools to help identify students who may be at risk of academic struggle or attrition. This would allow institutions to provide targeted support before issues become critical.

3. Promote faculty awareness and involvement in fostering academic hardiness through pedagogical approaches. Faculty can help cultivate a culture of growth mindset, encourage self-regulation, and model effective coping strategies during challenging coursework.

4. Further investigate interventions that specifically aim to increase hardiness, especially in students who demonstrate lower levels of persistence or academic performance. Pilot studies using experimental or quasi-experimental designs can help identify the best practices for boosting hardiness.

5. Expand future research to include diverse institutional contexts, such as community colleges, online universities, and minority-serving institutions, to ensure generalizability of findings and uncover any context-specific trends.

IX.   CONCLUSION

This study highlights the significant role of academic hardiness in predicting both academic performance and intent to persist among undergraduate students. The findings reveal that students who exhibit greater levels of commitment, control, and challenge tend to achieve higher GPAs and demonstrate stronger intentions to remain enrolled in their academic programs. These outcomes affirm the importance of addressing non-cognitive factors alongside traditional academic measures in efforts to enhance student success. Furthermore, the lack of significant differences in academic hardiness across demographic variables suggests that this trait is broadly applicable and may serve as a universal mechanism of resilience in diverse student populations. This finding reinforces the potential for scalable interventions aimed at fostering academic hardiness in all students, regardless of background. In sum, the study contributes valuable insights to both the theoretical understanding and practical implementation of student development strategies in higher education. By emphasizing the role of psychological resilience in academic outcomes, this research invites a rethinking of how institutions support student achievement and retention. It also paves the way for future studies to explore innovative, data-driven approaches to strengthening student persistence and performance through targeted non-cognitive interventions.

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