Ability and responsibility: Need for Cognition and study habits in academic achievement

Melissa J. Hawthorne
Louisiana State University-Shreveport

Alisha Cooper
Louisiana State University-Shreveport

Katie Chavis
Louisiana State University-Shreveport

Tracey Burrell
Louisiana State University-Shreveport

Cay Evans
Louisiana State University-Shreveport

ABSTRACT

Student success is an ongoing area of interest to educators and researchers alike. The current study seeks to expand the literature on what factors help or hinder students by examining the roles of Need for Cognition (NfC), academic motivation, and student study habits in academic success. The results indicated that NfC scores, Personal Responsibility, and Bad Study Habits are predictors of student success as measured by grade point average (GPA). In addition, students with high scores on the NfC scale had higher GPAs than did students with lower scores. Students who had lower scores on Bad Study Habits tended to do better than students with higher scores. Overall, the results indicate that both innate and external factors are important for success and can be used as guides to craft interventions for struggling students.

Key words: academic achievement, Need for Cognition, study skills, study habits, academic motivation

INTRODUCTION

Student success is a popular topic as universities face ever-increasing scrutiny of graduation rates. Although there has been considerable research into academic success and subsequent interventions, students continue to struggle, and a disturbing number of them fail to complete their degrees. According to the National Center for Education Statistics (2020), the most selective universities tend to do better with student retention, retaining first-time undergraduate students at a rate of 81%. In contrast, the retention rate at universities with open admissions policies was approximately 65% for the 2017-2018 academic year. When considering graduation rates as part of the whole scope of student success, the picture becomes even grimmer. Of the academic cohort entering undergraduate education for the first time in 2012, only 62% completed their degrees within 6 years (or 150% of the normal completion time). The extra time needed for completion means lost career and wage earning opportunities as well as increased amounts of student debt or out-of-pocket expense for these students.

Students often enter college because of the benefits that come with an advanced degree. Workers who hold a bachelor's degree make up 57% of all wage earners (Carnevale, Smith, & Strohl, 2016), and it is estimated that by 2021, 30% of job openings will require some college and 35% will require at least a bachelor's degree. A person's education level also provides some protection against unemployment during times of economic upheaval. During the recent job losses caused by the COVID-19 pandemic, workers who held a bachelor's degree or higher saw an unemployment level of 8.5% compared to 13.9% for employees with an associate's degree and 19.2% for those with a high school degree or less (Center on Education and the Workforce, 2020).

Educational attainment also provides benefits beyond employment status and financial gains. Increased social mobility, greater involvement in civic matters and volunteer activities, and higher levels of charitable donating are linked with increases in education (Ma, Pender, & Welch, 2019). Furthermore, more job satisfaction seems to follow advances in education. Approximately 60% of bachelor's degree holders report being highly satisfied with their current career compared to 43% of high school graduates who report their jobs as being unsatisfying (Baum, Kurose, & Ma, 2013). In sum, having an advanced degree contributes to better outcomes personally, financially, and socially.

Unfortunately, despite years of research into student success and how to promote it, students continue to struggle and too many leave higher education frustrated and without obtaining their degrees. Although we have pieces of the puzzle, there are still gaps through which students continue to fall. The goal of the current study is to examine students' personal attitudes and study strategies, in conjunction with academic motivation and intellectual curiosity in an effort to complete more of the student success puzzle. Towards this end, the study examined contributions of Need for Cognition, academic motivation, and various study strategies to student grade point average (GPA), which is a frequently used measure of academic success.

Need for Cognition and Academic Success

Academic success literature has consistently identified intellective variables as predictors of academic performance (Ackerman & Heggestad, 1997; Deary, Strand, Smith & Fernandes, 2007; Grass, Strobel & Strobel, 2017; Poropot, 2009; Schmidt & Hunter, 1998; Strenze, 2007). Over the last decade, an expansion of research further investigated the impact of non intellective

variables, or investment traits, on academic achievement (Richardson, Abraham & Bond, 2012; Warden & Meyers, 2017). Need for Cognition (NfC), an established investment trait, is based on the premise that some people tend to engage in effortful cognitive activities both for the sake of learning and for the enjoyment of the task (Cacioppo et al., 1984).

Studies that examined the academic success of college students and adults reported a positive relationship between NfC and academic achievement (Cacioppo, Petty, Feinstein, & Jarvis, 1996), intelligence scores (Fleischhaur, Enge, Brocke, Ullrich, Strobel, & Stroebel, 2010; Wilhem, Schulze, Schmiedek, & Süß, 2003), and student satisfaction (Grass et al., 2017). Although NfC is related to the concept of intelligence, Sojka (2008) makes the distinction that intelligence indicates ability while NfC brings compilation, problem-solving, and personal enjoyment of such endeavors into consideration. Just because students have the ability and the motivation to complete intellectual work, it does not automatically follow that they enjoy the task. Thus NfC is a separate, though related, construct in the puzzle of academic achievement.

Distinctively, individuals with high NfC have positive attitudes towards problem-solving, engage in deeper levels of information processing, and cope well with mentally stimulating endeavors (Meier, Vogl, & Preckel, 2014). Preckel, Holling & Vock (2006) found that the ability to gather and synthesize knowledge increases cognitive motivation in students with high NfC resulting in a solid performance in multiple academic disciplines. Students with high NfC also tend to post high GPAs, report high scores on standardized exams, and engage in rigorous academic work (Neigel, Behairy & Szalma, 2017) because they view thinking as a pleasant experience that contributes to a sense of personal satisfaction (Gray, Change & Anderman, 2015). Indeed, as undergraduate students increase their intellectual engagement, they are more satisfied with their personal accomplishments, academic success, and life as a whole (Coutinho & Woolery, 2004).

In contrast, students with low NfC often report the opposite experience. Unlike their counterparts who demonstrate a deeper application of knowledge, individuals with low NfC institute what Evan, Kirby and Fabrigar (2003) outlined as the surface approach to learning. Their goal is to transform the knowledge they receive into something that is easy to understand and remember (Cacioppo et al., 1996). Individuals with low NfC do not enjoy knowledge exploration and collection but often prefer a more structured approach with built-in strategies to assist (Evan et al., 2003). Preckel et. al (2017) suggested that NfC levels are impacted by learned experiences and behaviors which can be adjusted or even reversed with the proper interventions. In sum, NfC is advantageous because it promotes higher academic achievement while making the process into something to enjoy rather than endure.

Academic Motivation and Academic Achievement

Traditionally emphasis has been placed on academic motivation as a means to support and encourage academic achievement. Research supports this tradition. In the 1974 study, Cole found that achievement motivation was “most highly correlated with achievement.” Robinson (2003) found the NfC was a significant predictor of intrinsic motivation. Robinson found this in relation to motivational orientations to be predictive of GPA and achievement. Kosnin (2007) found self-regulated learning as a predictor of achievement, but in high achievers more significant than low achievers. Komarraju, Karau, and Schmeck found a positive relationship between motivation and GPA in their 2009 study. Amra et al. (2011) found a weak relationship between academic motivation and academic achievement. Yeager et al. (2014) found that a self-

transcendent purpose in students leads to greater academic self-regulation and a higher likelihood to persist toward goals.

The 2010 study by Hegarty used Vallerand's (1992) Achievement Motivation Scale (AMS) with graduate students in Education and Business programs and had inconclusive results. Similarly, the 2015 study by Çetin did not find a significant relationship between academic motivation measured by the AMS and academic achievement measured by GPA. Like the study by Kosnin (2007) and other research, Çetin did find a relationship between motivation and self-regulated learning. This lack of a significant relationship between academic motivation measured by the AMS and academic achievement measured by GPA is consistent with the findings of the current study.

Student Study Habits and Academic Achievement

From a historical perspective the "study of study" as related to academic achievement stretches as far back as the 1920s (Jones & Ruch, 1928). Research over the decades since has defined study, theorized about study, and examined factors related to study trying to find the connection between study and academic success (Aydin, 2017; Gentry, 2012; Gyllen, Stahovich, Mayer, Darvishzadeh, & Entezari, 2019; Haarala-Muhonen, Ruohoniemi, Parpala, Komulainen, and Lindblom-Ylanne, 2016; Lei, 2015; Rawson, Stahovich, & Mayer, 2017). The perspective on student success, Hunter (2006) and Aydin (2015) postulated has changed in recent years moving from "How should we teach students?" to "How should we help students learn?"

Gentry (2012) noted that there is no one skill that leads to academic success but rather a number of skills which when used become productive habits and that each individual has a unique way of processing information. Lei (2015) concurred that effective studying requires a personalized set of study skills and habits - or study patterns. The key is there is no particular or perfect study pattern that applies to all students; what works for one student may not work for another. However, the study patterns of individuals who are academically successful show a well-designed schedule or ritual.

Rawson, Stahovich, and Mayer (2017) were able to account for "time on task" issues related to self-reporting by students through their research on Smartpen technology. Their findings supported the time on task theory with a significant correlation between total time spent on the homework problems and course grade for all students combined, and for each cohort separately. In a similar study, Gyllen, Stahovick, Mayer, Darvishzadeh, and Entezari (2019) proposed that judging study time is a metacognitive skill supporting academic success, finding that students who make less accurate judgments of study time tend to achieve lower grades in courses.

METHOD

Participants

Ninety-one undergraduate students from a medium-sized university in the southern United States participated in the study. Five participants failed to correctly answer two out of three manipulation check questions, and their data were excluded from the study, leaving a total of 86 participants. (See Table 1 in the Appendix for descriptive statistics)

Materials

Each participant completed an academic strategy questionnaire, the Need for Cognition Scale (NFC; Cacappio, Petty, & Kao, 2013) and the Academic Motivation Scale (Vallerand, Pelletier, Blais, Briere, Senecal, & Valliéres, 1992).

Need for Cognition Scale

The Need for Cognitions Scale (Cacappico, Petty, & Kao, 2013) measures individual differences in participants' tendency to engage in and enjoy mental endeavors. The scale consists of 18 items with responses being on a Likert scale from 1-5 with 1 being highly "uncharacteristic of me." Higher scores indicate a greater need for cognition. Based on previous research, the Need for Cognition Scale appears to be a valid and reliable measure of individuals' tendencies to pursue and enjoy the process of thinking—that is, of their "need for cognition" (Cacioppo & Petty, 1982; Cacioppo, Petty, Feinstein, & Jarvis, 1996; Cacioppo et al., 1984; Sadowski, 1993; Sadowski & Gulgoz, 1992b).

Academic Motivation Scale

The Academic Motivation Scale (AMS: Vallerand et al., 1992) is based on Deci and Ryan's (1985) self-determination theory of academic motivation, which identifies three levels of academic motivation. The AMS contains 28 questions which are divided into 7 subscales of 4 questions each. The instrument has an internal consistency of .81 and a test-retest validity correlation of .79.

Academic Strategy Questionnaire

The academic strategy questionnaire consisted of 30 questions and asked the participants to indicate how strongly they agreed with each item. The scale ranged from 1-10, with 1 being "completely disagree" and 10 being "completely agree." For example, participants responded to prompts such as "I spend at least an hour each day studying" and "To prepare for exams, I like to test myself over the material to see how much I already know." An exploratory principal components analysis was used to identify any patterns in the participant responses.

Procedure

Each student completed the questionnaires and three attention checks using the SONA online research participation system. Manipulation check questions were included to ensure participants were reading and responding to the survey questions rather than simply clicking responses at random. Failure to correctly answer two out of three manipulation check questions resulted in the participants' data being discarded. The task was self-paced.

RESULTS

For the study habits survey, the internal reliability of the student responses was examined first. Coefficient alpha was .82, indicating a good level of consistency among the scale

items. An initial examination of the scree plot showed that four components accounted for 47.31% of the variance in participant responses. Next, a principal components analysis with a Varimax rotation and Kaiser normalization was used to identify the four components: Personal Responsibility, Good Study Habits, Bad Study Habits, and Study Time (see Table 2). Personal Responsibility consisted of questions relating to the participants' willingness to accept responsibility for their own study habits and class attendance. Good Study Habits consisted of statements regarding study habits that research has shown to be effective at promoting long-term retention of information (e.g., spaced practice, retrieval practice) whereas Bad Study Habits consisted of statements regarding poor retention practices (e.g., massed practice, lack of study time). Finally, Study Time consisted of statements regarding the amount and frequency of time spent preparing for classes and exams.

Next a linear regression analysis was conducted using participants' scores on the four factors, scores from the NfC scale, and academic motivation scores with student GPA as the predictor variable. The overall regression model was significant, $F(12, 72) = 2.553$, $p = .007$, with the predictors accounting for 29% of the variance in student GPA, $R^2 = .299$; $R^2_{Adjusted} = .182$. Examination of the individual predictors showed that Need for Cognition was the strongest predictor of student GPA ($\beta = .74$, $t = 10.42$, $p < .001$) followed by Bad Study Habits ($\beta = -.34$, $t = -3.39$, $p = .001$) and Personal Responsibility ($\beta = .14$, $t = 2.05$, $p = .04$). There were no other significant predictors (See Table 3). As a follow-up, median splits were performed and data for participants scoring at the median was removed, leaving a total of 71 participants. The remaining participants were divided into high and low scorer groups for each variable. three-way ANOVA was conducted using GPA as the dependent variable and NfC (median = 53; high score n = 39, low score n = 32), Personal Responsibility (median = 29; high score n = 39, low score n = 32) and Bad Study Habits (median = 15; high score n = 33, low score n = 38) as the independent variables. The analysis showed a main effect of NfC, $F_{(1, 63)}$ 6.23, $p = .015$, $\eta^2 = .075$, and of Personal Responsibility, $F_{(1, 63)} = .4.38$, $p = .040$, $\eta^2 = .053$. There were no significant interactions (See Figure 1 Appendix).

DISSCUSSION

The current study supports prior research demonstrating the importance of NfC in academics. In addition,the results identify student study habits and a sense of personal responsibility as significant contributors to student achievement. Specifically, bad study habits has a negative effect on GPA whereas a sense of personal responsibility for educational outcomes has a positive impact. When examining specific survey item responses, it was noted that students who take positive action to ensure their success (e.g., visiting professors during office hours) and who see themselves as being responsible for class preparation reported higher GPAs than students who see themselves as consumers purchasing a degree. In a similar vein, students who place the responsibility for their success on the instructor experience poorer outcomes. In addition, the presence of bad study habits (e.g., waiting until the night before an exam to study; failing to take notes in class) corresponds with lower GPAs. Interestingly, having poor study habits seems to influence student outcomes more than the presence of good study habits (e.g., testing oneself over studied material). Furthermore, students who score above the median on NfC and Personal Responsibility achieve better GPAs than students scoring below the median on those variables. Although these factors don't show a significant interaction, the trend indicates that students who combined a NfC with high levels of personal responsibility tend to

have the highest achievement in their course work.

Limitations and Directions for Future Research

While this study was successful and unbiased, limitations do exist. Having only ninety-one students participate in the study can be viewed as small and affect the perception of the results. Another limitation could be location, the participants were only in the southern United States for this study. Each region of The United States has diverse dynamics regarding education and could impact student responses on academic achievement. Also, having more females in this study, twice as many as males, could be considered a limitation. Similar to location, more male participants could influence the results with their views on education. Although individual demographic factors such as race/ethnicity and first-generation v. second-generation status are known to impact academic success (McCain, Hawthorne, Young-Jones, Pierce, & Smith, 2018), this study did not investigate them. An expanded review of these differences is certainly warranted for future studies. Finally, the questionnaire regarding student study habits merely scratched the surface of practices shown to influence student success. A more in-depth survey drawing from Dunlosky, Rawson, Marsh, Nathan, and Willingham's (2013) report card on learning techniques is being designed for a future study.

In sum, learning is a multifaceted endeavor that is helped or hampered by a multitude of variables, from the personal to the incidental. It is not surprising that there is no single fix-all to help students successfully navigate higher education. Quite likely, the secret lies in a combination of factors unique to each learner and learning situation. Educational research struggles to provide a comprehensive picture of the traits and techniques, perceptions and procedures, and possible interventions that can help our students thrive in their college experiences. The overarching goal is to provide a checklist of core attributes that are key to success and then design more personalized interventions around those attributes. The current study adds one more piece to the puzzle by demonstrating that students' Need for Cognition and sense of personal responsibility for their learning help them on their journey. It also demonstrates that poor study habits can sabotage their efforts and desire to learn. By putting these together in the overall picture, we move a bit closer to understanding how best to guide our students.

References

Ackerman, P. L., & Heggestad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121*(2), 219–245. https://doi.org/10.1037/0033-2909.121.2.219

Amrai, K., Motlagh, S.E., Zalani, H.A., & Parhon, H. (2011). The relationship between academic motivation and academic achievement students. *Procedia Social and Behavioral Sciences, 15*(2011), 399-404. www.sciencedirect.com

Aydin, G. (2017). Personal factors predicting college student success. *Eurasian Journal of Educational Research*, *17*(69), 93-112. https://doi.org/10.14689/ejer.2017.69.6

Baum, S., Kurose, C., & Ma. (2013). *How college shapes lives: understanding the issues.* https://research.collegeboard.org/trends/education-pays/resource-library

Cacioppo, J. T., Petty, R. E., Feinstein, J. A., & Jarvis, W. B. G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin, 119*(2), 197–253. https://doi-org.ezproxy.lsus.edu/10.1037/0033-2909.119.2.197

Cacioppo, J. T, Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment, 48*, 306-307.

Carnevale, A. P., Jayasundera, T., Gulish, A. (2016). *American's divided recovery: Colleges haves and have-nots.* Center on Education and the Workforce. https://cew.georgetown.edu/resources/reports/

Center on Education and the Workforce. (2020). *Tracking COVID-19 unemployment and job loss.* https://cew.georgetown.edu/cew-reports/jobtracker/

Cetin, B. (2015). Academic motivation and self-regulated learning in predicting academic achievement in college. *Journal of International Education Research 11*(2), 95-106.

Cole, J. (1974). The relationship of selected personality variables to academic achievement of average aptitude third graders. *The Journal of Educational Research, 67*(7), 329-333. Retrieved October 7, 2020, from http://www.jstor.org/stable/27536615

Coutinho, S. A., & Woolery, L. M. (2004). The need for cognition and life satisfaction among college students. *College Student Journal, 38*(2), 203–206.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York, NY: Plenum Press.

Deary, I. J., Strand, S., Smith, P., & Fernandes, C. (2007). Intelligence and educational achievement. *Intelligence, 35*(1), 13–21. https://doi org.ezproxy.lsus.edu/10.1016/j.intell.2006.02.001

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J. & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Directions from cognitive and educational psychology. *Psychological Science in the Public Interest, 14*, 4-58.

Evans, C. J., Kirby, J. R., & Fabrigar, L. R. (2003). Approaches to learning, need for cognition, and strategic flexibility among university students. *British Journal of Educational Psychology, 73*(4), 507–528. https://doi-org.ezproxy.lsus.edu/10.1348/000709903322591217

Fleischhauer, M., Enge, S., Brocke, B., Ullrich, J., Strobel, A., & Strobel, A. (2010). Same or different? Clarifying the relationship of need for cognition to personality and Intelligence. *Personality and Social Psychology Bulletin. 36*(1), 82–96.

DOI:10.1177/0146167209351886.
Gentry, R. (2012). Making college a success by assessing and navigating candidates' study habits. *Research in Higher Education Journal*, *18*, 1-13.
Grass, J., Strobel, A., & Strobel, A. (2017). Cognitive investments in academic success: The role of need for cognition at university. *Front. Psychol*. 8:790. doi: 10.3389/fpsyg.2017.00790.
Gray, D., Chang, Y., & Anderman, E. M. (2015). Conditional effects of mastery goal structure on changes in students' motivational beliefs: Need for cognition matters. *Learning and Individual Differences, 40,* 9-21.
Gyllen, J. G., Stahovich, T. F., Mayer, R. E., Darvishzadeh, A., & Entezari, N. (2019). Accuracy in judgments of study time predicts academic success in an engineering course. *Metacognition and Learning*, *14*(2), 215-228. https://doi.org/10.1007/s11409-019-09207-6
Haarala-Muhonen, A., Ruohoniemi, M., Parpala, A., Komulainen, E., & Lindblom-Ylänne, S. (2016). How do the different study profiles of first-year students predict their study success, study progress and the completion of degrees? *Higher Education*, *74*(6), 949-962. https://doi.org/10.1007/s10734-016-0087-8
Hegarty, N. (2010). Application of the Academic Motivation Scale to graduate school students. *The Journal of Human Resource and Adult Learning 6*(2), 48-55.
Hunter, M. S. (2014, December 29). *Fostering student learning and success through first-year programs*. Association of American Colleges & Universities. https://www.aacu.org/publications-research/periodicals/fostering-student-learning-and success-through-first-year-programs
Komarraju, M., Karau, S. J., & Schmeck, R. R. (2009). Role of the big five personality traits in predicting college students' academic motivation and achievement. *Learning and Individual Differences*, *19*(1), 47–52.
Kosnin, A. M. (2007). Self-regulated learning and academic achievement in Malaysian undergraduates. *International Education Journal*, *8*(1), 221–228.
Lei, S. (2015). Variation in study patterns among college students: A review of literature. *College Student Journal*, *49*(2), 195-198.
Ma, J., Pender, M., & Welch. (2019). *Education Pays: The Benefits of Higher Education for Individuals and Society*, https://research.collegeboard.org/trends/education-pays/resource-library
McCain, J. L., Hawthorne, M. J., Young-Jones, A., Pierce, B. H., & Smith, T. (2018). First-generation and Non-first-generation students: A multi-factor exploration of undergraduate success. *The Journal of College Orientation and Transition, 25*(2), 15-41
Meier, E., Vogl, K., & Preckel, F. (2014). Motivational characteristics of students in gifted classes: The pivotal role of need for cognition. *Learning and Individual Differences, 33*, 39-46. http://dx.doi.org/10.1016/j.lindif.2014.04.006.
National Center for Education Statistics. (2020. April). *Undergraduate retention and graduation rates*. https://nces.ed.gov/programs/coe/indicator_ctr.asp
Neigel, A. R., Behairy, S., & Szalma, J. L. (2017). Need for cognition and motivation differentially contribute to student performance. *Journal of Cognitive Education and Psychology, 16*(2), 144–156. https://doi-org.ezproxy.lsus.edu/10.1891/1945-8959.16.2.144

Poropat, A. E. (2009). A meta-analysis of the five-factor model of personality and academic

performance. *Psychological Bulletin, 135*(2), 322–338. https://doi-org.ezproxy.lsus.edu/10.1037/a0014996

Preckel, F., Holling, H., & Vock, M. (2006). Academic underachievement: Relationship with cognitive motivation, achievement motivation, and conscientiousness. *Psychology in the Schools, 43*(3), 401–411. https://doi-org.ezproxy.lsus.edu/10.1002/pits.20154

Rawson, K., Stahovich, T. F., & Mayer, R. E. (2017). Homework and achievement: Using smartpen technology to find the connection. *Journal of Educational Psychology*, *109*(2), 208-219. https://doi.org/10.1037/edu0000130

Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin, 138*(2), 353–387. https://doi-org.ezproxy.lsus.edu/10.1037/a0026838

Robinson, N. M. (2004). Academic motivation and its relationship to personality variables and achievement. *Dissertation Abstracts International: Section B: The Sciences and Engineering, 64*(9-B), 4632.

Rowell, L., & Hong, E. (2013). Academic motivation: Concepts, strategies, and counseling approaches. *Professional School Counseling, 16*(3), 158-171. Retrieved October 7, 2020, from http://www.jstor.org/stable/profschocoun.16.3.158

Schmidt, F. L., and Hunter, J. E. (1998). The validity and utility of selection methods in personnel psychology: practical and theoretical implications of 85 years of research findings. Psychol. Bull. 124, 262–274. doi: 10.1037/0033-2909.124.2.262

Sojka, J. Z., & Deeter-Schmelz, D. R. (2008). Need for cognition and affective orientation as predictors of sales performance: An investigation of main and interaction effects. *Journal of Business and Psychology, 22*(3). 179-190. Doi: 10.1007/s 10869-008-9069-x.

Strenze, T. (2007). Intelligence and socioeconomic success: A meta-analytic review of longitudinal research. *Intelligence, 35*(5), 401–426. https://doi-org.ezproxy.lsus.edu/10.1016/j.intell.2006.09.004

Vallerand, R. J., Fortier, M. S., & Guay, F. (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72*(5), 1161-1176. https://doi.org/10.1037/0022-3514.72.5.116

Warden, D. N., & Myers, C. A. (2017). Non intellective variables and nontraditional college students: A domain-based investigation of academic achievement. *College Student Journal, 51*(3), 380–390.

Wilhelm, O., Schulze, R., Schmiedek, F., & Süß, H.-M. (2003). Interindividuelle unterschiede im typischen intellektuellen *Engagement. Diagnostica, 49*, 49–60. doi:10.1026//0012-1924.49.2.49.

Yeager, D.S., Henderson, M.D., Paunesku, D., Walton, G.M., D'Mello, S., Spitzer, B.J., & Duckworth, A.L. (2014). Boring but important: A self-transcendent purpose for learning fosters academic self-regulation. *Journal of Personality and Social Psychology 107*(4), 559-580. http://dx.doi.org/10.1037/a0037637.supp

APPENDIX

Table 1. Study demographics

Variable	*n*
Biological sex	
Female	65
Male	26
Total	91
Class	
Freshman	16
Sophomore	14
Junior	26
Senior	25
Total	91
First-generation	
Yes	39
No	52
Total	91
Race/ethnicity	
African American	29
White	34
Hispanic	19
Bi-racial	3
Other	6
Mean age	23.23 (8.31)
Range	19-47

Table 2. Rotated component loading for survey items

Component	1	2	3	4
Daily study time	.186	.546	-.167	-.171
Academic choices	.705	-.011	-.016	-.185
Weekly study time	.201	.721	.028	.023
Missing class	.457	.408	-.016	-.135
Need-based study time	.771	-.098	.143	.090
Equal study time	.028	.848	.174	.043
Social engagements	.563	.182	-.284	. 046
Repeated study	.740	.214	-.149	.134
Study review	.368	.122	-.129	.113
Cramming	-.080	-.281	.431	.220
Study with friends	-.174	-.158	.094	.525
Class prep	.143	.654	-.237	.086
Note taking	.750	.138	-.101	-.197
Note strategy	-.411	.179	.345	.250
Spaced study	.064	.749	.017	.071
Cumulative exams	.312	-.246	.305	.224
Ask questions	.553	.201	.011	.037
Office visit	.314	.102	.127	-.072
Self testing	.488	.278	.219	.373
Exam preference	.138	-.065	.677	-.263
Responsibility-self	.679	.022	.091	-.003
Connection of ideas	.280	.218	-.062	.633
Learning style-visual	.481	.155	.105	.327
Responsibility-professor	.292	-.066	.659	-.005
Learning styles-general	.719	-.063	.091	.097
Deadlines	-.017	-.407	.437	.462
Preparation for class	-.076	.466	.060	.410
Consumer attitude	-.094	-.019	.705	.256
Learning style-auditory	-.127	.248	.620	.047
Review and test	.588	.055	.045	.559
Eignvalues	6.29	3.46	2.85	1.60
Percent total variance	20.97	11.53	9.49	5.33

Table 3. Regression results

Factor	β	t	p
NfC	.343	3.13	.002*
IKnow	-.028	-.164	.870
IAccom	.196	1.116	.268
IStim	-.012	-.088	.930
ExIdent	.138	.803	.425
ExIntroj	-.350	-2.00	.059
ExReg	.028	.186	.853
Amotivate	-.292	-1.76	.083
Personal Responsibility	.147	2.05	.043*
Study Time	.007	.101	.920
Good Study Habits	-.088	-1.22	.227
Bad Study Habits	-.338	-3.39	.001*

*p < .05

Figure 1.
Differences in high and low scores