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ACADEMIC ACHIEVEMENT AS A FUNCTION OF INTRINSIC MOTIVATION AND DISTRACTION DURING STUDY

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ACADEMIC ACHIEVEMENT AS A FUNCTION OF INTRINSIC MOTIVATION
AND DISTRACTION DURING STUDY

A Thesis

Presented To

Eastern Washington University

Cheney, Washington

In Partial Fulfillment of the Requirements

for the Degree

Master of Science in Experimental Psychology

By

Ryan A. Willcockson

Spring 2017

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ACADEMIC ACHIEVEMENT AS A FUNCTION OF INTRINSIC MOTIVATION AND DISTRACTION DURING STUDY

Self-determination can be characterized as one's own effort to perform a task without any external force. Distraction by cell phones, social media or television during online course work, study time, or in the workplace can negatively impact performance and attention. The aim of the current study was to explore the relationship between students' intrinsic motivations, their tendency to study with distractions present, and their overall academic success. Participants consisted of 215 undergraduate students in online psychology courses. Participants completed the Needs Assessment Questionnaire, and gave self-reports about their usage of their cell phone, social media, and television during study. The students' final percent in their course served as the dependent variable. The hypotheses were that "Overall Percent in Class" would be (1) lower among participants who reported more distractions while studying; (2) lower among participants who were higher in the need for affiliation and who study with distractions present; and (3) higher among participants who were higher in the needs for autonomy and achievement, and who had lower distraction scores. A multivariate analysis of variance failed to support these hypotheses, but significant main effects and interactions were found among several variables.

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Academic Achievement as a Function of Intrinsic Motivation and Distractions During Study

Motivation is recognized by researchers as one of the strongest determinants of a student's overall academic success (Deci & Ryan, 1985; Heckert et al., 2000; Seiver & Troja, 2014). Deci and Ryan (1985) suggest that individuals are naturally drawn to their own development of an internal structure of oneself. Because humans are very curious creatures – self-motivated, eager to learn new skills, and apply their own personal talents – Ryan and Deci (2000) concluded that overall, an individual's performance can be thwarted or supported through having their motivational needs met; this is explained through Self-Determination Theory (SDT).

Self-Determination Theory

According to SDT (Deci & Ryan, 1985; 2002) there are four motivational needs that must be met in order for an individual to perform well, and for an extended period of time. Those motivations are: Affiliation, dominance, achievement, and autonomy. The structure of SDT is regularly explained using six smaller theories: Cognitive Evaluation Theory (Deci, Cascio & Krusell, 1975), Organismic Integration Theory (Deci & Ryan, 2008), Causality Orientations Theory (Stevens et al., 2014), Basic Psychological Needs Theory (Ryan & Deci, 2008; Vansteenkiste and Ryan, 2013), Goal Contents Theory (Cheng & Chartrand, 2003; Levesque et al., 2008) and Relationships Motivation Theory (Baumeister & Leary, 1995). Together these theories are the basis for SDT and its relation to students' overall academic performance.

Theories of Intrinsic and Extrinsic Motivation.

Together, the six motivational theories behind SDT constitute the theoretical foundation for the research behind student performance under the influences of distraction. This research can be extended toward describing a student or employee's performance when distraction is present (Deci & Ryan, 2000; Heckert et al., 2000; Seiver & Troja, 2014).

Cognitive Evaluation Theory

Effects of social contexts such as reward, interpersonal controls, and the involvement of one's own ego on intrinsic motivation can have either negative or positive effects on student performance (Amorose & Anderson-Butcher, 2015). In a study examining students' perceived autonomy-supportive, and non-supportive behaviors by sports coaches on multiple high school-aged athlete types (baseball, basketball, football, soccer, softball, swimming, tennis, track, volleyball and wrestling), Amorose and Anderson-Butcher (2015) found that an autonomous, and supportive athletic coaching style was significantly more effective in getting the student athletes to perform well overall than a controlling coaching style, resulting also in a higher number of positive responses from athletes about their coaches. Autonomy-supportive styles are also advantageous to students' academic environments through teachers allowing their students to take control of their own learning, such as many online courses do. By allowing students to be autonomously supported, they gain more feelings of competency and achievement, which have both been shown to be predictors of higher overall academic performances amongst college students.

Organismic Integration Theory

Extrinsic motivators can have robust, but short-lived effects on an individual's intrinsic motivation (Deci & Ryan, 2008). Extrinsic motivators can include external regulation, adopting another individual's values, identifying oneself with another individual or group, and acceptance by peers. Deci and Ryan (2008) proposed that extrinsic motivators work along a continuum, such that (1) external regulation (peer-opinion) and (2) integration (personal values) are on opposite ends, with (3) introjection (accepting of peer-opinion) and (4) identification (partially making a peer-opinion your own) being in the middle.

With external motivators varying in the degree to which they are internalized and run along the continuum, they affect an individual's performance in different ways. As an example, students in situations where they feel that they are receiving peer-rejection will perform more poorly in meeting learning goals than those who receive peer-acceptance; the same goes for personal values and opinions (Koestner, et al., 1996). If students' peers hold different personal values or opinions, and that difference is felt, a student's performance can decline while their need for relatedness is not being met (Koestner, et al., 1996)

Causality Orientation Theory

Causality Orientation Theory proposes that there are three types of causality orientation that can predict motivation and performance over time: Orientation for autonomy, orientation for control, and the impersonal orientation, which are all predictors of motivation and performance. Koestner and Zuckerman (1994) suggest that when students are faced with academic learning goals, autonomous oriented individuals

perform well overall, and face failure in a mastery-oriented fashion (i.e., individual is focused on developing new skills, improving, and acquiring additional knowledge; the individual attempts a task over and over again until they fully accomplish the goal of the task.)

Impersonal-oriented individuals respond to failure in a helpless manner and perform worse than autonomously oriented individuals. The response of control-oriented individuals to failure is described as ego-involved, and these individuals perform lower than individuals with an autonomous orientation (Koestner & Zuckerman, 1994).

Basic Psychological Needs Theory

Basic Psychological Needs Theory poses that psychological well-being and optimal physiological functioning share a relationship through the intrinsic motivators of autonomy, competence, and relatedness. Through a combination of these three intrinsic motivators, resilience in an academic setting can be displayed, and students' overall performance (resilience) in a course reflects whether they had their three motivational needs met or not throughout the length of the course (Vansteenkiste & Ryan, 2013). As an example, individuals are vulnerable to restriction of their well-being when they are not allowed to access distractors while studying, not receiving autonomously-supportive instruction, nor receiving positively framed tasks. Lower academic resilience among college participants is strongly associated with a restriction of their well-being (Vansteenkiste & Ryan, 2013).

Goal Contents Theory

An individual's motivation to perform well is based on whether the goal is intrinsically or extrinsically valuable to them. In the context of extrinsic goals, how

motivated an individual becomes about achieving that goal, and performing well on a task can be determined by how that goal, or instructional piece of a task is framed (or primed). As an example, Cheng & Chartrand (2003) had students participate in a goal manipulation task, where they were asked to monitor dots that were quickly shown on a computer screen (at the top or bottom) accompanied by a word. The words consisted of a positive-goal prime (e.g., socializing, going out, partying, celebrate, and dancing), a goal-neutral prime (e.g., ballpoint, bucket, entrance, window, and sidewalk), or a goal-negative prime condition (e.g., pain, disease, trash, sorrow, and thief). Ultimately, Cheng & Chartrand (2003) found that goal-negative primed words within conditions resulted in less accuracy of dot location during trials. Both positive-goal, and goal-neutral primed words revealed about the same accuracy among students overall, but still greater accuracy than goal-negative primed words.

Relationships Motivation Theory

Relationships Motivation Theory explains how individuals create and maintain close relationships with one another. It has been found that close relationships are essential for an individual's well-being and good academic performance (Baumeister & Leary, 1995); close meaningful relationships satisfy the need for relatedness (Ali et al., 2013; Baumeister & Leary, 1995).

A greater need for relatedness paired with support of that student's need in an academic setting has produced good and bad performances, and academic persistence over time (Ali et al., 2013; La Guardia & Patrick, 2008). In both studies, Ali et al. (2013), and La Guardia & Patrick (2008) asked Native and Anglo-American students across multiple fields of study to respond to a questionnaire that measured their needs for

competition, social power, affiliation, and social concern. Native-American students who were highest in the need for social concern and affiliation had the lowest overall performance, whereas the Anglo-Americans, who were highest in the needs for competition and social power, had the highest overall performance.

Conversely, a student's greater need for relatedness paired with thwarting of that need has been associated with bad academic performance. Together, these six theories make up the foundation for understanding SDT, and how supporting or thwarting a student's motivational needs can affect their performance outcomes.

Measuring Intrinsic Motivations

The Needs Assessment Questionnaire (NAQ; Heckert et al., 2000) measures levels of motivation within four domains: Affiliation, dominance, achievement, and autonomy. Measuring an individual's motivation has become one of the strongest ways of predicting performance across many different settings; educational and employment included (McClelland, 1961).

The NAQ uses questions that have been positively or negatively correlated to each motivation, and relies on a Likert-type scale running from 1 (strongly disagree) to 5 (strongly agree). Respondents decide how well each item describes them and the things they like to do. The need for affiliation is measured with items such as, "I spend a lot of time talking to other people," whereas the need for dominance is measured with items such as, "I would enjoy being in charge of a project." Achievement motivation is assessed with items such as, "It is important to me to do the best job possible," and the need for autonomy is measured with items such as, "I would like a career where I have very little supervision."

Evidence for the validity and reliability of the NAQ was provided by Heckert et al. (2000), by comparing internal consistency measurements of the NAQ with the Manifest Needs Questionnaire (MNQ; Steers & Braunstein, 1976), which also assesses motivational needs. Heckert et al. (2000) state that the MNQ has been reported to have problematic internal consistency of its Likert-scale scores ($< .70$). The NAQ's internal consistency measurements were found to be higher than the MNQ's in both the creation and confirmation samples.

While there are many needs assessment scales available for research, the NAQ is one of the most popular (Heckert et al., 2000; Seiver & Troja, 2014). The NAQ is a reliable and valid predictor of motivation and performance for assessing a college student sample (Heckert et al., 2000), and has high internal consistency, high test-retest reliability, and high content validity.

Distraction

Attentional abilities can be affected by an individual's motivation or needs satisfaction (Brose, 2012). Attention has a limited capacity, and depending on an individual's task demands, any one task may only receive a limited amount of attention, if any at all. Attention is flexible, and as a result, it can change without one noticing (Cherry, 1953; Wood & Cowan, 1995).

The concept of attention can be divided into two components: 1) a filter, which features a switch or an attenuator, and 2) capacity, which describes the amount of automatic or effortful attention available for primary and secondary tasks. The switch model of attention says that when an individual is paying attention to one task or stimulus, no attention is available for any other task or stimulus. Specifically, when an individual

thinks they are multitasking, they are actually switching their attention between tasks entirely (Wedel et al., 2008). The attenuator model, like a dimmer switch, portions an individual's attention to more than one task at a time, but no task receives full attention. As a result, some attention is on one task and some is on another – e.g., if 80% of attention is on task 1, that leaves 20% of attention for task 2 (Hovarth, 2014). In each of these models, attention is driven by characteristics of the stimulus (Stein & Peelen, 2015). Stimuli that can be distracting have characteristics that are salient (i.e., they are noticeable), engaging (i.e., they are interesting to the individual), novel (i.e., they are new to the individual), surprising (i.e., the individual did not expect to encounter those stimuli), or startling (i.e. they evoked a fear response). The presence of extraneous stimuli with one or more of these characteristics can make a primary task more or less demanding. When performing multiple tasks at once (dividing attention), each task receives a portion of the available attention, so that no one task receives full attention.

Under these models of attention, multitasking or divided attention is just not possible; performance declines as the number of secondary tasks increases, or as more demanding secondary tasks are introduced to a primary task (Finley et al., 2014; Hirst et al., 1980; Lin et al., 2011). Bjornsen and Archer (2015) found that students who used their cellular phone during study sessions had reduced performance in the course and lower overall grade point average (GPA). Alzahabi and Becker (2013) found that performance on a number-letter recognition task was negatively affected by attending to social media as a secondary task, and Brasel and Gips, (2011) found poorer performance by students who reported having a television on during study time. Although multitasking can affect individuals differently under different types of task demands, it appears that

overall; individuals who chronically multitask perform worse on a number-letter task than individuals who do not multitask (Finley et al., 2014).

Some specific immediate and long-term effects of working with distractors present can be poorer memory recall (Finley et al., 2014), difficulty in tuning out distractions (Kreitz et al., 2015), and less organized working memory, making it hard to return to tasks once stopped, and reducing deep processing of to-be-remembered material (Kreitz et al., 2015).

In the current study, the effects of distraction while studying and of intrinsic motivations on lower-division college students' grades in an online psychology course were examined. Distraction score was determined from students' reports of having access to social media, a cell phone, and/or television while studying. The NAQ was used to assess the needs for affiliation, achievement, autonomy, and dominance. Grades were provided by the course instructor, and were divided into four types: Weekly adaptive learning quizzes, which were graded pass/fail; weekly quizzes based on videos, which were graded for accuracy; alternate weeks writing assignments which were graded for content; and final percent in the course, which included the adaptive quizzes, the weekly quizzes, the writing assignments, midterms, and a variety of other assignments. The current study focused on final percent in the course as the dependent variable, and predicted that (1) participants who report more distractions while studying will have a lower "Overall Percent in Class;" (2) participants who are higher in the need for affiliation and who study with distractions present will have a lower "Overall Percent in Class;" and (3) participants who are higher in the needs for autonomy and achievement and have lower distraction scores will have a higher "Overall Percent in Class."

Method

Participants

A total of 215 (172 female, 42 male, 1 did not provide sex) online community college students from the Puget Sound area of Washington State participated in the current study in return for extra credit in their online psychology course. Participants' ages ranged from 18 to 58 years of age, with a mean age of 25.58 years old. Participants responded anonymously to the online survey, and provided their student identification numbers (SIDs) so that their online instructor could provide their course scores.

Materials

The Needs Assessment Questionnaire (NAQ; Heckert et al., 2000) consists of 20 items, scored on a Likert-type scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The NAQ predicts levels of intrinsic motivation for each of four needs: Autonomy, achievement, dominance, and affiliation. Autonomy is defined as an individual's preference to take on a task independently (e.g., "I like to be my own boss"). Achievement describes a preference for performing and completing tasks to the best of one's ability (e.g., "It is important to me to do the best job possible"). Dominance refers to a motivation to compete with, or to perform better than, peers (e.g., "I seek an active role in leadership of a group"). Affiliation is the need to be in contact with other individuals (e.g., "Before a test, I like to study with a group rather than by myself"). High scores on a subscale suggest a higher need in that area, and possible scores range from five to 20 on each subscale. In the current sample, Cronbach alpha coefficients were .67 for the affiliation subscale, .65 for the autonomy subscale, .82 for the dominance subscale, and .71 for the achievement subscale.

A distraction questionnaire was constructed, consisting of three questions about usage of cell phones, social media and television during study time: 1) “Do you have a cellular phone near you when you are studying?” 2) “Is there a television in your study space?” 3) “Do you have access to social media during your study time?” For each item, participants responded by clicking on a radio button to indicate “Always,” “Only Sometimes,” or “Never.”

Participants’ online instructor provided four types of grades: Weekly adaptive learning quizzes, weekly quizzes, alternate-weeks writing assignments, and final grades in the course.

“Weekly Adaptive Learning Quizzes” consisted of between two and seven “Learning Curve Games” each week. These games took a maximum of 30 minutes to complete if students had read their textbooks prior to playing them, and full credit was earned once the game was complete.

“Weekly Quizzes” consisted of watching a video and completing a short quiz about it or completing a “Self-Assessment” and writing a short reflection on it. Both assignments were graded based on accuracy, were due weekly, and took between 15 and 20 minutes to complete.

The “Alternate-Weeks Writing Assignments” consisted of choosing one of several topics from a list of options, completing the task, and writing a report on the activity. The assignments were due in alternate weeks, and were graded for accuracy and completeness.

“Overall Percent in Class” was the student’s actual earned percent in the class by the end of the term. Percent consisted of the three assignments described above, plus a midterm, final, and other assignments that were not pulled out for individual inclusion in this study.

Procedure

Participants were recruited through an announcement in their online classes. They were offered extra credit, and were assured that their names and grades would never be revealed to the researcher, and that their names and answers to the research questions would never be revealed to their online instructor. For students interested in participating, a direct link to the Survey Monkey survey was provided.

At Survey Monkey, participants read a short description of the survey, including sample items, and provided their consent to taking part in the study. On the next screen, the 20-item NAQ was given, with radio buttons for each of the Likert rating options arrayed horizontally beneath each question. The distraction scale was presented on the next screen, with radio buttons for each response option. On the next screen, participants were asked to enter their student identification number, and on the next screen were the demographic questions (sex and age). The final page thanked the participants for their time, and provided instructions for how to take a screenshot of the thank you page to submit to their instructor for their extra credit.

A median-split on each of the motivation subscales created groups that contained participants who were high and low in each category: Affiliation, $N_{\text{Low}}=100$, $N_{\text{High}}=69$; Autonomy, $N_{\text{Low}}=86$, $N_{\text{High}}=83$; Achievement, $N_{\text{Low}}=84$, $N_{\text{High}}=85$; and dominance, $N_{\text{Low}}=101$, $N_{\text{High}}=68$. Participants who did not answer all of the questions within a

subscale were dropped from that subscale, so the Ns in the high and low groups did not sum to the total N in the sample. A distraction score was computed for each participant by summing their responses to all three questions and converted into a distraction category score, representing low (N=45), medium (N=88), and high (N=36) levels of distraction present while studying. These categorical groupings served as the independent variables, and “Overall Percent in Class” served as the dependent variable.

Results

A 3 (Distraction Category) x 2 (Need for Affiliation Category) x 2 (Need for Achievement Category) x 2 (Need for Dominance Category) x 2 (Need for Autonomy Category) multivariate analysis of variance (MANOVA) was performed on the dependent variable of “Overall Percent in Class.”

Main Effects

The main effect of distraction was significant, $f(1, 124) = 6.71, p = .002, \eta^2 = .10$ (see Figure 1). Post hoc tests revealed that the high distraction group ($M=94.63, SD=7.66$) had a lower “Overall Percent in Class” than the medium ($M=94.62, SD=6.30$) and low ($M=90.36, SD=9.56$) groups, which were not significantly different.

The main effect of affiliation was not significant, $f(1, 124) = 3.66, p = .06, \eta^2 = .03$. Individuals who had a higher need for affiliation ($M=92.53, SD=8.26$) did not have a significantly lower “Overall Percent in Class” than the individuals who reported having a lower need for affiliation ($M=94.15, SD=7.56$).

The main effects of achievement, dominance, and autonomy were all non-significant, $f < 1$.

Interactions

The interaction of distraction with affiliation was not significant, $f(2, 124) < 1$. The interaction of distraction with achievement was significant, $f(2, 124) = 3.10$, $p = .05$, $\eta^2 = .05$ (see Figure 2). The interaction between distraction score with achievement revealed that an individual with high distraction/high achievement ($M=96.59$, $SD=5.88$) received the highest “Overall Percent in Class.” High distraction/low achievement ($M=96.38$, $SD=1.883$), and medium distraction/low achievement ($M=93.59$, $SD=5.69$) were the next best performers, followed by individuals with high distraction/low achievement ($M=92.67$, $SD=8.84$). Overall, the lowest “Overall Percent in Class” was seen amongst individuals who were low distraction/low achievement ($M=90.41$, $SD=8.38$), and low distraction/high achievement ($M=90.30$, $SD=11.08$).

The interaction of distraction with dominance was not significant, $f(2, 124) = 1.84$, $p > .05$, $\eta^2 = .03$, nor was the interaction of distraction with autonomy, $f < 1$. Affiliation did not significantly interact with achievement ($f < 1$), dominance $f(1, 124) = 3.60$, $p = .06$, $\eta^2 = .03$, or autonomy ($f < 1$). The interaction of achievement with dominance was significant, $f(1, 124) = 9.80$, $p = .002$, $\eta^2 = .07$ (see Figure 3). Average “Overall Percent in Class” was highest amongst the high achievement/low dominance ($M=96.06$, $SD=6.79$) individuals and the high achievement/high dominance ($M=92.61$, $SD=9.15$) individuals. Low achievement/low dominance ($M=92.50$, $SD=8.00$) students performed moderately, whereas those in the low achievement/high dominance group ($M=92.36$, $SD=5.28$) received the lowest average percentage.

The interaction of achievement with autonomy was not significant ($f(1, 124) = 2.04, p > .05, \eta^2 = .02$), nor was the interaction of dominance with autonomy ($f < 1$).

There were no significant 3-way interactions among distraction, affiliation, and achievement ($f(2, 124) = 1.57, p > .05, \eta^2 = .03$), distraction, affiliation, and dominance ($f(2, 124) = 2.23, p > .05, \eta^2 = .04$), or distraction, affiliation, and autonomy ($f < 1$). The interaction of distraction, achievement, and dominance was significant ($f(2, 124) = 4.76, p = .01, \eta^2 = .07$ (see Figure 4). The highest “Overall Percent in Class” was seen amongst individuals with high distraction/high achievement/high dominance ($M=98.40, SD=5.21$). The medium distraction/low achievement/low dominance ($M=96.32, SD=5.58$) group had the second best average percent in the course. Medium distraction/high achievement/high dominance ($M=94.46, SD=5.02$), and high distraction/low achievement/low dominance ($M=94.26, SD=7.45$) performed nearly the same in their course. The two groups with the lowest “Overall Percent in Class” were low distraction/high achievement/high dominance ($M=92.46, SD=4.50$), and low distraction/low achievement/low dominance ($M=90.47, SD=10.45$).

Neither the interaction among distraction, achievement, and autonomy ($f < 1$), nor the interaction of distraction, dominance, and autonomy ($f < 1$) was significant.

None of the 3-way interactions of affiliation and the remaining motives was significant, with $p > .05$: Affiliation, achievement, and dominance ($f(1, 124) = 3.01, \eta^2 = .02$); affiliation, achievement, and autonomy ($f(1, 124) = 3.09, \eta^2 = .02$); affiliation, dominance, and autonomy ($f(1, 124) = 1.89, \eta^2 = .02$).

The interaction of achievement with dominance and autonomy was not significant, $f(1, 124) = 2.63, p > .05, \eta^2 = .02$. None of the 4-way interactions was significant at the $p < .05$ level.

Discussion

The current study's hypotheses predicted that (1) participants who reported more distractions while studying would have a lower "Overall Percent in Class;" (2) participants who were higher in the need for affiliation and who study with distractions present would have a lower "Overall Percent in Class;" and (3) participants who were higher in the needs for autonomy and achievement and had lower distraction scores would have a higher "Overall Percent in Class." This study found that (1) participants who had a higher need for affiliation did not have higher distraction scores; (2) participants with higher distraction scores did not have a lower "Overall Percent in Class;" and (3) participants with a higher need for autonomy and achievement, who exhibited lower distraction scores, did not receive significantly higher overall percent in class than participants with low needs for autonomy and achievement and higher distraction scores. Nevertheless, significant interactions were found between some of the intrinsic motivations and distraction scores on "Overall Percent in Class."

Unlike the findings of Ryan and Deci (2000), participants within the current study who reported a higher need for affiliation did not perform significantly worse than participants who reported a low need for affiliation; our first hypothesis is; thus, not supported. The current findings fail to support the predictions of the Basic Psychological Needs Theory (Vansteenkiste & Ryan, 2013) and the Relationships Motivation Theory (Baumeister & Leary, 1995). Individuals do not appear to manifest their need for feeling

related by staying connected through distractions while studying for their college courses. These results also refute Thornton et al.'s (2014) finding that even the mere presence of a cell phone can hinder performance on cognitive tasks.

Hypothesis number two was not supported by the current study either. Altmann et al., (2014) and Rosen et al., (2013) found that more distractions can negatively impact performance and attention during tasks, but the current study reveals that fewer distractions was associated with poorer performance in the course than medium to high levels of distraction. The current findings may be tapping into one of the features of the distractors assessed (access to a cell phone, to social media, and to television while studying)—that is, students may have been using the distractors to help them with their schoolwork, and as a result, their “Overall Percent in Class” benefitted from the presence of the distractors.

Lastly, hypothesis number three was not supported, because individuals who reported higher levels of autonomy and achievement, and who had lower distraction scores, did not receive a higher “Overall Percent in Class” than participants who did not receive a higher distraction score, and who had lower self-reported needs for autonomy and achievement. This finding is contrary to the findings of Brasel and Gips (2011) and Finley et al. (2014), both of which found that highly distracted individuals (ones who switched between a reading task and multimedia often) performed significantly lower than individuals who did not switch between tasks as often; low performance was associated with high rates of multitasking and higher need for autonomy and lower need for achievement. Both studies used distractors such as a computer with social media access, and a television with changeable channels. It is shocking that these same

distractors were not associated with poorer performance in the current study. Similarly, it is surprising that autonomy and achievement levels within the current study did not predict lower distraction scores, or a higher “Overall Percent in Class.”

The current study’s findings are surprising in light of Ryan and Deci’s (2000) assertion that a higher need for autonomy and achievement should predict better task performance. Indeed, both Heckert et al.’s (2000), and Seiver and Troja’s (2014) study’s found that a higher need for autonomy and achievement predicted greater task performance.

In the current study, students who had medium to high rates of distraction during studying or during their online class, and who had a higher need for achievement, tended to have a higher grade in the course overall than did individuals who reported low amounts of distraction, and who had lower needs for achievement. It may be that students who frequently use social media, or their cell phone are using these distractors to find answers or get immediate help/feedback during their study, or work time. Even if cell phones or social media are not to be used during course time, it may be that the mere access to social media, or a cell phone does help an individual to perform better overall; the distractions do not compromise the student’s ability to perform overall. Students with a higher need for achievement are more successful in their course overall because it has been shown that a higher need for achievement is associated with better performance on tasks overall.

With lower rates of distraction, and high needs for achievement, however, students do not perform as well. It may be that these students are not using social media or their cell phone to look up answers, or find feedback and help on assignments or tests;

these students may hold higher, personal ethics values than those who were high distraction/high achievement (the highest performers), and may believe that it would be cheating to look up answers or ask for help on their school assignments.

Individuals with low needs for achievement and low rates of distraction performed the worst overall because a low need for achievement is generally characterized by lower performance overall. Low rates of distraction indicate that the student(s) either chose not to use social media or their cell phones while studying, that they do not have those present in their study area because they do not own them, or they do not have a dedicated space where they typically study. Any of these explanations could support an interpretation that the lack of distractions in the study space also indicates circumstances that are associated with poorer academic performance. It is important to note that in past studies concerned with examining how distractions cognitively affect performance, students were placed in isolated areas, and were asked to perform specific tasks under time constraints. In the current study, students were not placed into isolation, they were not asked to perform only certain tasks, nor were they under abnormal time constraints to complete assignments or quizzes. In the current study, the student's ability to freely perform and provide their own distractions while studying may be another key factor behind how students can perform well while still having distractions present.

Students with a higher need for achievement and a lower need for dominance yield a higher grade in the course overall than did individuals who had a higher need for achievement, and higher need for dominance. This may be because individuals who are high in the need for achievement tend to perform well on tasks, and their lower need for

dominance allowed them to perform well even in an online course – with its notable absence of opportunities to compare themselves to their peers.

However, individuals who are high in achievement and high in dominance performed slightly worse than individuals with high achievement and low dominance. This may be because these individuals want to perform better than other students, but in online courses, their need to compare themselves to others is unfulfilled.

These two-way interactions are rendered meaningless, however, in the face of the significant three-way interaction of distraction, achievement, and dominance. When distraction is included in the interaction, the pattern of interaction between achievement and dominance changes: Individuals with high amounts of distraction/high achievement/high dominance performed the best overall. The interaction between high distraction and high achievement is still present, and probably for the same reasons. High distraction students are using distractors to help them succeed in their online course, either through looking up answers to their assignments or exams, or receiving feedback on how to correctly perform, and those with high achievement are particularly likely to use their distractors in that way. In this three-way interaction, the high dominance students in the high distraction category and who have high need for achievement may be using distractors to help them succeed in class and to reassure themselves that they are going to outperform other students.

Overall, this study illustrates that a student's amount of distraction during their online course, and their needs for affiliation, dominance, autonomy and achievement all interact to affect their overall performance within an online course.

The findings of the current study are important because although cell phones,

social media and television can hinder task performance, it appears that they may not be the underlying reason for low performance in an online course. Instead, the four underlying motivational needs (affiliation, achievement, dominance and autonomy) may be the critical factors in performance in an online course.

Limitations of the current study include: The inability to measure cognitive ability among individuals quickly and affectively, and the inability to determine why an individual might report lower or higher cell phone, social media or television usage when they have full access to them or not. Also, having students answer online surveys in order for us to gather data is a limitation to this study.

An individual's intellectual level is a limitation of this study because we did not measure intelligence for those students who are receiving good grades while also having a higher distraction score. We did not ask for their college grade point average (GPA), or give them any type of intelligence inventory. It may be that those students who are low in intelligence and are using distractors to help them through their work, amount to having a better grade overall in their course. It may also be that those who are high in distraction, but also achieving higher grades are highly intelligent. Conversely, intelligent individuals could be performing lower, too, if they are not using distractors as tools, or do not prefer distractors present during study. Determining a quick and affective way to measure students' intelligence level may lead to a better understanding of how higher distraction scores reveal higher grades in the course overall.

When considering access to distractors among students, students may be reporting low levels of distraction because they do not have good Internet access, poor cell phone coverage, no television package, or not enough finances to afford any distractors.

Lastly, it is widely known that online surveys can receive false responses made by students. However, the current study was able to at least view the students' actual overall course grade through the course instructor's permission, and after anonymity was ensured.

Further, future research should utilize other measures of intrinsic motivation, because it is possible that the NAQ may not fully capture an individual's desire for relatedness with academic peers in an online classroom setting. This is a concern because, although the NAQ's internal consistencies were seen to be higher than that of the MNQ's, an internal consistency rating of .75 or lower is still somewhat questionable. The current study's internal consistency averaged .68, which leaves the NAQ's meaningfulness in question, at least for this sample.

A further recommendation would be to examine more closely the environment in which individuals study during online course work or study time. As asserted earlier, it is possible that some students study in the presence of distractors that end up benefitting their class performance, whereas others study in the absence of those distractors for a variety of reasons – many of which may be associated with poorer performance. To fully determine the role of distraction while studying, these unanswered questions need to be addressed.

It may also be advantageous for future research to study the affects of affiliation, achievement, dominance and autonomy with distractors in the workplace. Current cohorts of college students will soon enter the workforce, bringing with them habits of working while having access to distractors such as social media and cell phones. It is important for us to understand the effect on productivity and concentration that these distractors have.

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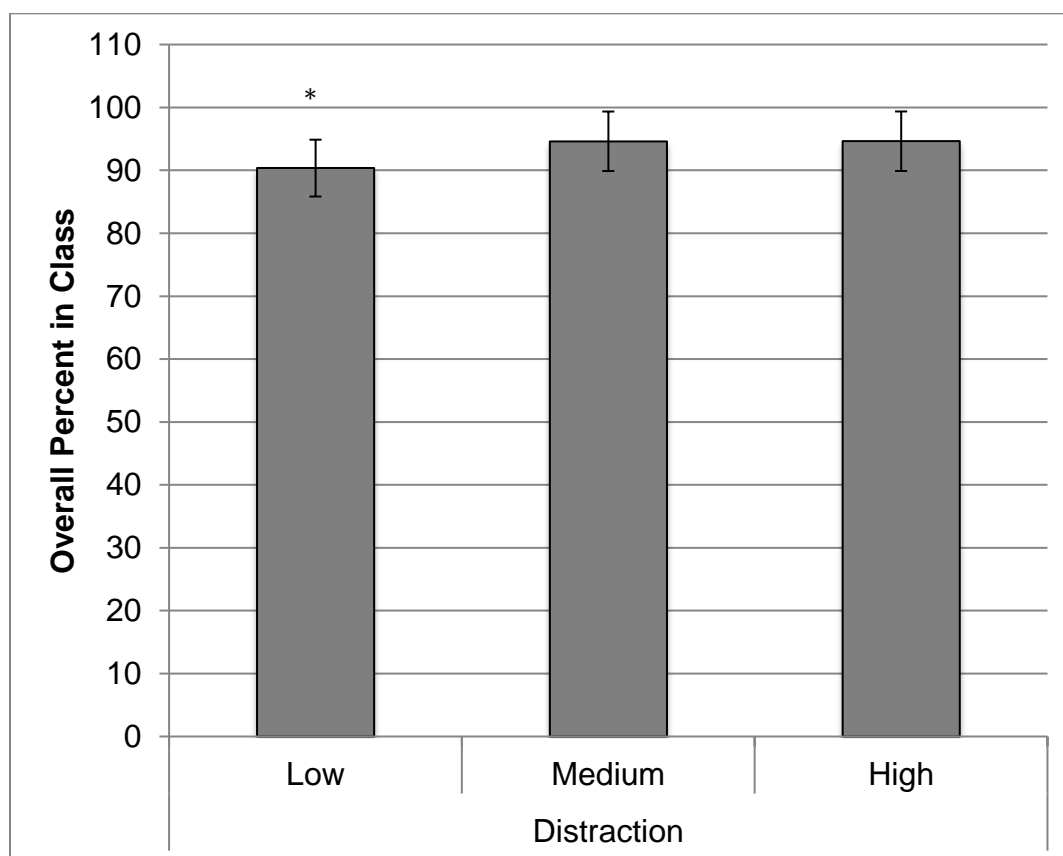


Figure 1. Main effect of distraction on a students' "Overall Percent in Class." Mean distraction scores are self-reports of the amount of distraction a student has during study time. Error bars represent standard error (.05). * indicates significantly different at the $p < .05$ level.

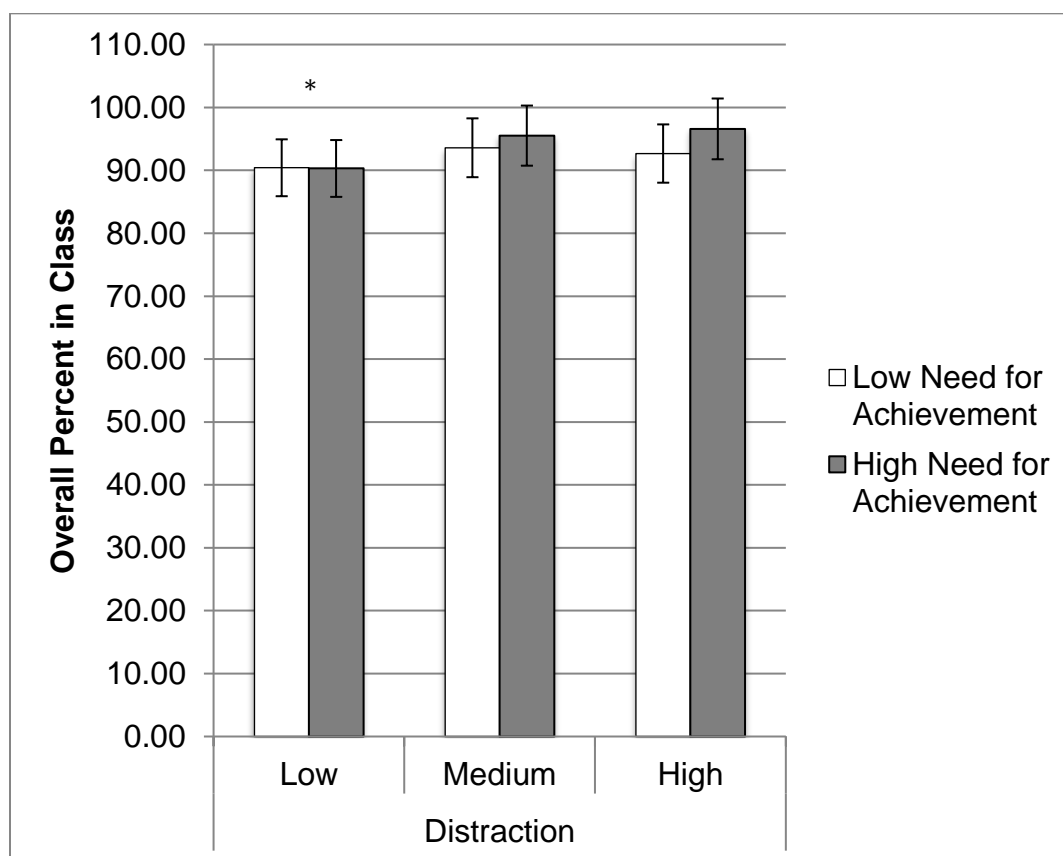


Figure 2. Interaction between distraction score with a student's need for achievement on "Overall Percent in Class." Mean distraction scores are self-reports of the amount of distraction a student has during study time. Error bars are standard error (.05). * indicates significantly different at the $p < .05$ level.

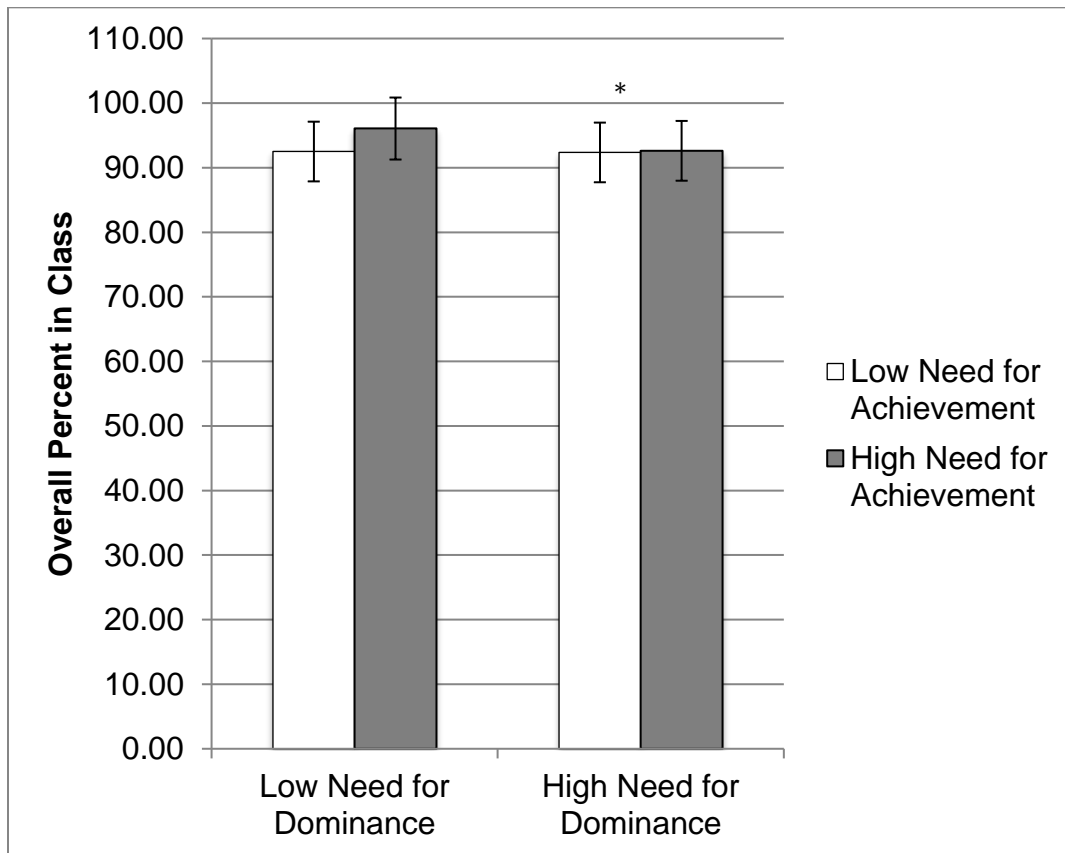


Figure 3. Interaction between a students' need for achievement with their need for dominance on their "Overall Percent in Class." Students' average need for achievement and need for dominance is measured using the Needs Assessment Questionnaire. Error bars are standard error (.05). * indicates significantly different at the $p < .05$ level.

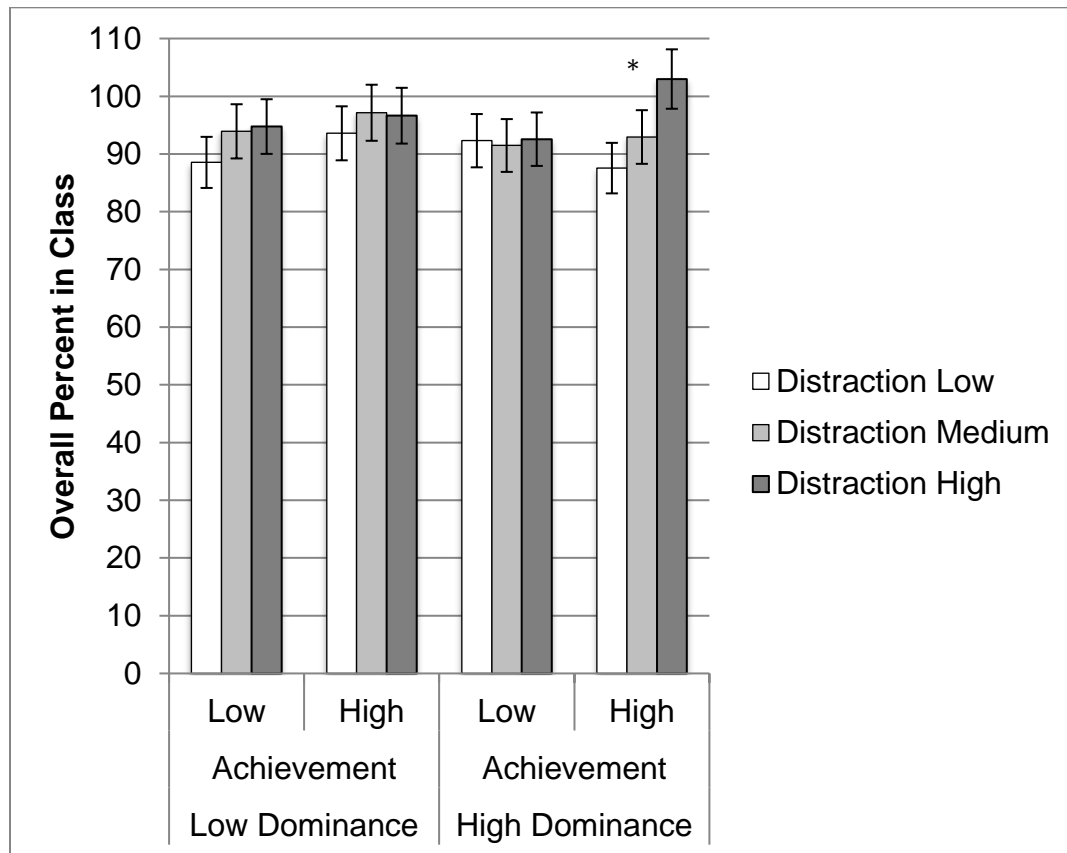


Figure 4. Interaction between a student's amount of distraction with their need for achievement, and need for dominance on their "Overall Percent in Class." Mean distraction scores are self-reports of the amount of distraction a student has during study time. Students' average need for achievement and need for dominance is measured using the Needs Assessment Questionnaire. Error bars are standard error (.05). * indicates significantly different at the $p < .05$ level.

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