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The Personality of a "Good Test Taker": Self-Control and Mindfulness Predict Good Time-Management When Taking Exams

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ARTICLE INFO

ABSTRACT

Much prior research has linked trait self-control and trait mindfulness with improved performance on overall academic metrics such as GPA. The present research expands on this literature by linking self-control, mindfulness, and closely related personality constructs to differences in the way students manage their time while taking exams. Students at two large public universities (total n = 362) completed scale measures of self-control, mindfulness, and their use of time when taking timed examinations. The results suggest that trait self-control (r = .174) and trait mindfulness (r = .311) are statistically significant predictors of effective time management while taking timed exams.

1.Introduction

What makes some students "good test takers" whereas other seemingly equally intelligent students fail to perform? Researchers have identified many factors other than intelligence that affect students performance on exams, such as stereotype threat (Good, Aronson, & Inzlicht, 2003), anxiety (Cassady & Johnson, 2002), and study habits (Culler & Holahan, 1980). Evidently, many variables can affect how well a student actually performs on test day. The difficulty of succeeding on exams is compounded by the fact that many academic exams are timed. Timed examinations present additional and unique challenges to the student. Performing well on such assessments requires regulating attention to the test while ignoring distractions, pacing oneself on questions, being self-aware of one's own knowledge, and monitoring one's progress on individual problems against the time being used so to decide when to skip to the next question, among other things. In sum, effective test taking, particularly on timed exams, requires effective self-regulation and strong awareness of one's situation, not only intelligence. Therefore, students with personality traits that predispose them to effective self-regulation and attention to their current situation, should predict effective time management with taking exams. Two such personality traits are self-control and mindfulness.

1.1. Self-Control and Academic Performance

Self-control is commonly understood to mean intentionally modifying one's automatic behaviors or responses so to act in a way consistent with long-term goals, values, or acceptable standards (e.g., Baumeister, & Heatherton, 1996). Stable individual differences in self-control exist such that the self-control exhibited by someone as a child is a reliable predictor of self-control decades later (Mischel, Shoda, & Rodriguez, 1990). Furthermore, the amount of self-control a person displays in one area of life can predict self-control displayed in other areas of life. For example, people who show weak self-control when choosing between smaller but immediate monetary rewards rather than larger/later ones, also tend to show weaker self-control when trying

to limit their alcohol consumption (Osgood & Muraven, in press). For this reason, psychologists often measure self-control as a personality trait using self-report scales (e.g., Tangney, Baumeister, & Boone, 2004) and/or ratings of observed behaviors by other people such as parents and teachers (e.g., Duckworth & Seligman, 2005). Although the myth persists among members of the western public that academic achievement is primarily the result of innate ability, social science research often finds that trait self-control predicts academic success better than IQ (see Duckworth, Quinn, & Seligmann, 2012).

The connection between individual differences in self-regulation and overall academic performance is well established in nearly every student age group and longitudinally (see de Ridder, Lensvelt-Mulders, Finkenauer, & Baumeister, 2012). In a classic study on the delay of gratification, social psychologist Walter Mischel asked young children to choose between receiving a single marshmallow immediately, or waiting an undefined amount of time for two marshmallows (Mischel & Ebbesen, 1970). When the same children were assessed a decade later, those who had waited longer in the original study grew up to be more academically successful adolescents than those who gave in to temptation more quickly: they earned higher grades (Mischel, Shoda, & Peake, 1988) and achieved higher SAT scores (Shoda, Mischel, & Peake, 1990). More recently, Duckworth and Seligman (2005) reported the results of a longitudinal study where self-control assessed at the start of the school year via questionnaires completed by parents, teachers, and students themselves predicted end of year academic achievement better than IQ in a two groups of eighth graders.

Indeed, individual differences in self-control consistently predict academic success. For example, several studies report strong correlations between trait level measures of self-control and college grade point average (GPA) (Duckworth, Quinn, & Tsukayama, 2012; Duckworth & Seligman, 2005; Tangney, Baumeister, & Boone, 2004; Wolfe & Johnson, 1995). Relatedly, Hogan and Weiss (1974) found that students elected to the academic honor society Phi Beta Kappa scored higher on the California Psychological Inventory (CPI) measure of trait self-control than a sample of equally intelligent students who were not elected to the honor society.

Although the relationship between self-control and major metrics of academic success such as GPA are well represented in the literature, fewer studies have researched links between trait self-control and specific academic behaviors. Some exceptions to this include research by Duckworth and colleagues (2005; 2012), which found that students with higher self-control tended to complete homework more regularly, procrastinate less, spend more time on schoolwork, and less time on non-academic related distractions such as television watching. Still, no published research has assessed how trait self-control might predict effective testing behaviors when taking exams. Nevertheless, there is strong theoretical grounding to predict that students who are higher in trait self-control would manage their time better when taking tests. Pacing oneself well on an exam requires maintaining focus and resisting the tendency to daydream or attend to distractions. It also requires the self-regulatory skills and willpower to make decisive choices about how to use one's limited time (e.g., choosing to skip a question when too much time is being used, answering easy questions first, etc) in a stressful situation. Unfortunately, the stress of examinations impairs effective self-control in many students (Oaten & Cheng, 2005) Furthermore, weak self-control can cause inattention and susceptibility to boredom and distractions (Osgood, 2015). Thus, possessing high trait self-control would be a great advantage and should predict more effective time management with taking exams.

1.2. Mindfulness and Academic Performance

In addition to resisting distractions and having the willpower to take decisive action, effective time management requires awareness of how much time is passing, how much time is left, and how much is being spent on each question. In other words, managing time when taking exams necessitates that one is mindful of their present situation, thoughts, and behaviors. This tendency to be "present" in the moment is called mindfulness (Kabat-Zinn, 2003). Specifically, mindfulness refers to one's level of awareness regarding their present situation and take a nonjudgmental posture towards one's thoughts and feelings (Schraer et al., 2017). Like, self-control, relatively stable individual differences in mindfulness are thought to exist (Davis, Lau, & Cairns, 2009). Correspondingly, trait mindfulness can be assessed via self-report questionnaires (Lau et al., 2006).

Although mindfulnesses role in academic success does not have the longstanding pedigree that self-control enjoys, new research over the past decade is slowly building a case for mindfulness as an instrument for learning (See Meiklejohn et al., 2012; see also Zenner, Herrnleben-kurz, Walach, 2014). In one experiment, 61

spanish high-school students were randomly assigned to either 10 weeks of mindfulness training or received no such training (Franco, Manas, Cangas, & Gallego, 2010). The academic performance of the students who received the mindfulness training improved significantly more than the performance of those who did not receive the training over the course of the study. Similar results have been found in studies using elementary school students (Bakosh, 2013) and undergraduate college students (Napora, 2013).

However, this nascent literature has some shortcomings. First, not all results have been so supportive. For instance, Brausch (2011) did not uncover a significant correlation between trait mindfulness and first semester college GPA. Second, like self-control, the role of mindfulness in specific academic behaviors is somewhat limited. Rather, most of the literature focuses on effect of mindfulness in reducing student stress/anxiety, cognitive performance, and emotional resiliency (Zenner, Herrnleben-kurz, Walach, 2014). Of particular interest to the current investigation, the relationship (if any) between mindfulness and time management on exams has yet to be investigated. Indeed, in general, the literature is lacking any examination of trait personality factors that predict specific behaviors on timed exams.

1.3. Present Research

The purpose of the present research is to investigate the role of self-control and mindfulness on time management when students take exams. Performance on timed exams often constitute a large percentage of a student's grade in a course and timed achievement tests such as the SAT and GRE are used in admissions decisions for post-secondary and post-graduate degree programs. Clearly, the stakes are very high for students to perform well on timed exams. Thus, better understanding what personality factors relate to students behaviors when taking such exams is important. In the present investigation, students completed personality scales that measured trait self-control (and closely related constructs) and mindfulness along with questions that measured their use of time while taking exams. Effectively managing one's time on exams requires self-monitoring, situational awareness, regulating attention, and effective decision making. These behaviors are associated with strong self-control and mindfulness (See Osgood & Salamone, 2017). Thus, trait self-control and mindfulness were both predicted to be positively associated with effective time management.

2.1. Study One

2.1.1. Methods

2.1.1.2. Participants

230 undergraduate students from a large public university in the northeastern United States arrived to complete the study. Students completed this study in exchange for partial course credit. Data from five participants either failed to record properly, the participants did not complete the study, or their responses were otherwise lost. Thus, data from 225 (125 Female; Age: M = 18.8, SD = 1.2) were used in analysis. Data collection began upon approval by the institutional review board and continued until the conclusion of the academic semester. Data was not analyzed until data collection was complete. All participants involved in the study are accounted for in the summary above.

2.1.1.3. Materials and Procedures

Upon arriving in the laboratory, participants were administered informed consent and taken to a computer station to complete the study which consisted of a series of surveys meant to measure self-control (and closely related constructs) as well as a questionnaire that asked them about their time management when taking timed exams. This data collection was done as part of a large-scale self-report study on the role of self-control in different aspects of college-life (e.g., academics, romantic relationships, student employment, etc). However, only those questionnaires related to self-control and time management on exams are reported here as that is the focus of the present paper. The order of the questionnaires was fully counterbalanced between participants. Specifically, participants completed the Self-Control Scale (SCS; Tangney et al., 2004); Values in Action Regulation of Self Subscale (VIA.SC; Petersen & Seligman, 2004); Values in Action Industriousness Subscale (VIA.IND; Petersen & Seligman, 2004); California Personality Inventory Self-Control Subscale (CPI; Gough, 1987); Emotion Based Decision Making Scale (EBDM; Barchard, 2001); and Grit Scale (GRIT; Duckworth, 2007). The VIA and CPI scales were accessed via the International Personality Item Pool (IPIP;

Goldberg et al., 2006). Finally, all participants completed a ten item experimenter created survey to assess various aspects of time management when taking exams (TTQ). All questions were answered on a Likert-Type scale with options ranging from 1 = "Not at all true" to 7 = "Very True". This included the following items (* indicates reverse coded in analysis). All questions on the survey are reported here:

"When taking a timed test...

1.   "...it is easy for me to spend too much time on a single question."*

2.   "...if I do not know the answer to a question, I always quickly skip it and proceed to the next one."

3.   "...I will persist on a question or problem until I am satisfied with my answer, even if this takes a lot of time."*

4.   "...I sometimes spend a lot of time thinking about a single question."*

5.   "...if there are questions I still don't know after having finished the rest of the test, I will often run out the clock trying to figure out these questions."*

6.   "...I tend to use all of the available time because I keep trying to figure out the answer to questions I do not know."*

7.   "...I pace myself well."

8.   "...I keep an eye on the clock."

9.   "...I make sure that I have time to view every question."

10.   "...I lose track of time easily." *

2.1.3. Results

The initial reliability of the experimenter created test taking scale was α = .73, items two and eight were dropped to maximize reliability at α = .79. Data from all questionnaires used in this study were normally distributed. Descriptive data is displayed on Table 1 and correlations between measures and outcomes are displayed on Table 2.

Table 1. Descriptive Data For Study One Surveys

Survey	Mean (SD)	*n*	α
SCS	82.8 (14.6)	225	.79
VIA.SC	49.1 (9.1)	225	.70
VIA.IND	41.0 (7.7)	225	.82
CPI	42.7 (10.0)	225	.77
EBDM	34.7 (9.1)	225	.84
GRIT	52.9 (8.2)	225	.67
TTQ	34.1 (8.6)	224	.73

Note: SCS: Self-Control Scale (Tangney et al., 2004); VIA.SC: Values in Action Regulation of Self Subscale (Petersen & Seligman, 2004); VIA.IND: Values in Action Industriousness Subscale (Petersen & Seligman, 2004); CPI: California Personality Inventory Self-Control Subscale (Gough, 1987); EBDM: Emotion Based Decision Making Scale (Barchard, 2001); GRIT: Grit Scale (Duckworth, 2007); TTQ (Overall Test Taking Questions, experimenter created).

Table 2. Pearson's Correlations for Study One

	SCS	VIA.SC	VIA.IND	EBDM	GRIT	TTQ
SCS	-	.427**	.511**	-.186**	.581**	.280**
VIA.SC	-	-	.386**	-.121~	.402**	.091
VIA.IND	-	-	-	-.022	.691**	.149*
EBDM	-	-	-	-	-.045	-.152*
GRIT	-	-	-	-	-	.181**
TTQ	-	-	-	-	-	-

Note: ~ p < .1, * p < .05, **p < .01. SCS: Self-Control Scale (Tangney et al., 2004); VIA.SC: Values in Action Regulation of Self Subscale (Petersen & Seligman, 2004); VIA.IND: Values in Action Industriousness Subscale (Petersen & Seligman, 2004); CPI: California Personality Inventory Self-Control Subscale (Gough, 1987); EBDM: Emotion Based Decision Making Scale (Barchard, 2001); GRIT: Grit Scale (Duckworth, 2007); TTQ (Overall Test Taking Questions, experimenter created).

2.2. Study Two

Study two was designed to serve two purposes. First, study two was intended to conceptually replicate the overall finding in study one that trait self-control is positively associated with effective test taking habits in a second independent sample of students at a different university. Second, study two sought to extend the finding of study one by testing the research hypothesis that trait mindfulness is positively correlated with effective test taking time management habits.

2.2.1. Methods

2.2.1.2. Participants

137 undergraduate students (84 Female; Age: M = 19.2, SD = 1.4) from a large public university in the southeastern United States participated in the study in exchange for partial course credit. Data collection began upon approval by the institutional review board and continued until the conclusion of the academic semester. Data was not analyzed until data collection was complete. All participants involved in the study are accounted for in the summary above.

2.2.1.3. Materials and Procedures

Upon arriving at the laboratory, participants were administered informed consent by the experimenter. Data collection was typically conducted with two participants at a time sharing a room, but at different desks not directly facing each other. Following the informed consent, participants completed the questionnaires (paper versions) one at a time. Participants were asked to notify the experimenter when they had completed a questionnaire so the experimenter could provide the next one. Participants were given a short (one minute) break between each questionnaire to reduce cognitive fatigue and attention loss. All personality questionnaires completed by participants are reported here. All participants completed the Toronto Mindfulness Scale/Questionnaire (TMQ; Davis et al., 2009), the same VIA.SC from study one, and an experimenter-produced questionnaire about exam time management, updated from and based on the questionnaire used in study one. Participants also completed a brief demographics survey. The experimenter created test taking survey for study two (TTQ_2) used in this study included the following items that were each answered on a four point Likert-Type scale where one = "Very Infrequently" and four = "Very Frequently" (* indicates items that were reverse coded in analyses). All questions on the survey are reported here.

"When taking a timed test…"

1. ...I spend too much time on a single question*

2. ... if I do not know the answer to a question, I always quickly skip it and proceed to the next one.

3. ...I will persist on a question or problem until I am satisfied with my answer, even if this takes a lot of time.*

4. ... if there are questions I still do not know after having finished the rest of the test, I will use all the remaining time trying to figure out these questions.

5. ...I pace myself well

6. ...I keep an eye on the clock

7. ...I make sure that I have time to view every question

8. ...I lose track of time easily*

9. ...I need to read test questions more than once before I understand them well enough to answer.*

10. ...I continue to study right up to the moment before the test starts.*

2.2.3. Results

Initially, the experimenter created test taking survey had an inter-item reliability of $\alpha = .51$. This was maximized by dropping items six and ten to $\alpha = .64$. Data from all questionnaires used in this study were normally distributed. Descriptive data is displayed on Table 3 and correlations between measures and outcomes are displayed on Table 4.

Table 3. Descriptive Data For Study Two Surveys

Survey	Mean (SD)	n	α
TMQ	56.2 (9.7)	137	.81
VIA.SC	30.5 (5.3)	137	.76
TTQ_2	22.7 (3.6)	137	.64

Note: TMQ: Toronto Mindfulness Questionnaire (Davis et al., 2009); VIA.SC: Values in Action Regulation of Self Subscale (Petersen & Seligman, 2004); TTQ_2 (experimenter created survey of test time management revised for study two).

Table 4. Pearson's Correlations for Study Two

	TMQ	VIA.SC	TTQ_2
TMQ	-	.272**	.311**
VIA.SC	-	-	.188*
TTQ_2	-	-	-

Note: * p < .05, ** p < .01. TMQ: Toronto Mindfulness Questionnaire (Davis et al., 2009); VIA.SC: Values in Action Regulation of Self Subscale (Petersen & Seligman, 2004); TTQ_2 (experimenter created survey of test time management revised for study two).

3.Discussion

The purpose of the present investigation was to test the hypothesis that high trait self-control and mindfulness predict more effective use of time when taking timed tests. These hypotheses were broadly supported across both studies. In study one, four out of the five scales used to assess trait self-control and closely related constructs were significantly correlated with students overall score on a questionnaire designed to assess how effectively students use their time when taking exams. In study two, the relationship of trait self-control and effective time management on exams was replicated in a different sample at another university. Furthermore, study two demonstrated a statistically significant relationship between trait mindfulness and test taking time management.

The present research represents an useful addition to the literature on trait self-control/mindfulness and academic performance. To date, most research measuring these personality traits have limited their investigations to linking them with general measures of academic success (e.g., GPA). To the authors knowledge, no other study has investigated the relationship between either trait self-control or trait mindfulness on specific student testing behaviors. This is unfortunate for several reasons. First, robust evidence now exists that self-control is a major predictor of academic success, even greater than IQ (Duckworth & Seligman, 2005), yet only a small number of studies have researched how specific academic behaviors relate to self-control; none of which look at test taking behaviors. Second, test scores often constitute a large component of a student's course grade and are used as major factors in academic admissions decisions, yet little is known about the personality factors that predict effective vs. ineffective test taking. Indeed, most research on test taking and personality has focused only on test anxiety. Finally, trait self-control and mindfulness can be stably changed with training (See Osgood & Salamone, 2017). Thus, reliable links between these traits and effective test-taking open the door to the possibility that training self-control/mindfulness may improve student testing performance. In sum, identifying the specific beneficial academic behaviors that are related to self-control is perhaps more useful than documenting links between traits and overall academic success. Doing so allows theorists to better understand the relationship between individual differences and academic success and empowers educators to identify and assist students at risk for counterproductive school behaviors more effectively.

The findings of these studies can help educators better understand and identify students who struggle when taking timed exams. In time, this may lead to more effective interventions to improve students testing performance and increase academic achievement. These findings have particular relevance for standardized achievement tests such as the GRE, MCAT, SAT, etc. Such tests are designed to make time usage a performance variable. In other words, these tests are written with more questions than most students are reasonably expected to be able to answer in the time they are given and reward effective time use. For example, on the SAT, each question is weighted the same, despite varying in difficulty. This rewards students who are able to move through the test efficiently and answer as many questions correctly as possible without squandering too much time on any given question when progress is not being made. Thus, those students who manage their time better would hold a distinct advantage over equally intelligent peers with poorer time management on such exams. Indeed, high self-control has already been linked to improved achievement test scores (Shoda et al., 1990). It is likely that high trait-mindfulness would be positively associated as well.

The applicability of these findings are not limited to achievement tests such as the SAT. Students with learning disabilities are particularly and negatively affected by exam time limits on regular academic tests relative to their normally achieving peers (e.g., Alster, 1997). Although not considered here, it is possible that self-control and mindfulness may be particularly important for students with learning disabilities. More concretely, mindfulness based training may improve test taking in some students who ordinarily require extended time. This is a future research direction that will need and should receive attention.

Although this research contributes positively to the literature overall, there are some shortcomings that should be addressed. Mainly, use of time on exams was assessed via self-report questions. A good follow-up for this research would be to observe students taking actual exams while coding their behaviors for effective/ineffective time management. The second shortcoming of the present research is that neither study collected measures of test performance such SAT or ACT scores. Future studies should consider testing

mediation models where mindfulness improves time management, which in turn improves scores on standardized exams where time is an important factor.

In addition to what was previously mentioned, the results of the present research suggest several promising avenues for future research. First and foremost, researchers should test whether programs that train self-control and/or mindfulness can improve students time management on exams. New research in social psychology suggests that both trait self-control and trait mindfulness can improve substantially and stably with training (See Osgood & Salamone, 2017). Combining those recent findings with the present research, it is likely that similar training could improve time management (and test scores) on standardized exams such as the GRE, MCAT, SAT, AP, and ACT. A reliable link between training mindfulness and improving testing habits would be a boon to college educators as many universities have begun implementing mindfulness training on campus, thus the infrastructure would already be in place to offer mindfulness training as a way to improve testing performance. Second, researchers should seek to investigate what other personality traits influence students time management when taking exams. For example, one might reasonably expect that certain Big Five "OCEAN" (John, Donahue, & Kentle, 1990) factors such as conscientiousness and neuroticism to be positively and negatively related to time management on tests, respectively. Third, the regulation of time on exams deserves more attention in general. Although time management tactics are basic curriculum for many achievement test preparatory course, relatively little scientific research has investigated how students naturally regulate their time while taking tests. Fourth, researchers should investigate the interaction between the stressfulness of a testing situation and personality factors like trait self-control or mindfulness on texting behaviors. For instance, perhaps in low stress testing situations (such as when there is ample time or the stakes of the test are low) the effect of personality of testing behaviors is weaker than in highly stressful testing situations. Finally, beyond self-control and mindfulness and even beyond test taking, the personality and learning literature would benefit from more research that links personality to more specific academic behaviors with defined contexts (such as regulating time while taking exams) rather than focusing mainly on broad measures like GPA or graduation rates.

In conclusion, academic researchers have come a long way in identifying individual differences that contribute to academic success. Perhaps chief among these individual differences is self-control, while the role of the related attribute of mindfulness has only more recently received attention. The present research builds off of this tradition by also affirming the positive relationship between strong self-control, strong mindfulness, and academic success. Importantly, the present research adds to the literature by implicating self-control and mindfulness as important predictors of how students regulate their use of time when taking exams. Although additional research will be needed, the future holds the promise of better understanding test-taking and building a world where fewer students think of themselves as "bad test takers".

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