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Conscientiousness and Academic Performance: A Mediational Analysis

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Abstract

Previous research has established that a relationship exists between the personality trait of conscientiousness and academic achievement. The current study extends prior research by using a path analysis model to explore various proximal traits that may mediate this relationship in a sample of two hundred and twenty three undergraduate university students. Consistent with previous research, a strong positive relationship was found between conscientiousness and academic performance as measured by final grades. Of greater importance, two factors were found to mediate this relationship: Academic Self-Efficacy and Test Anxiety. The current study illustrates the complex nature of the relation between personality traits and academic achievement and indicates that personality likely has a distal effect on academic performance through more proximal characteristics.

Keywords

Big five, Personality, Conscientiousness, Academic achievement, Academic performance

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Abstract

Previous research has established that a relationship exists between the personality trait of conscientiousness and academic achievement. The current study extends prior research by using a path analysis model to explore various proximal traits that may mediate this relationship in a sample of two hundred and twenty three undergraduate university students. Consistent with previous research, a strong positive relationship was found between conscientiousness and academic performance as measured by final grades. Of greater importance, two factors were found to mediate this relationship: Academic Self-Efficacy and Test Anxiety. The current study illustrates the complex nature of the relation between personality traits and academic achievement and indicates that personality likely has a distal effect on academic performance through more proximal characteristics.

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Introduction

Scholars of pedagogy in higher education have long focused on teaching and learning techniques to address the unique needs of individual students. Understanding individual differences in academic performance is critical to meeting the needs of today's diverse student population. Knowledge of the factors that influence academic performance has important implications for learning and education, in terms of tailoring teaching techniques to individuals' learning styles and for curricula design. While research indicates that cognitive ability is one important determinant of academic success (Ackerman & Heggestad, 1997), cognitive ability alone may be unable to account for the variation evident in university students' academic performance (Chamorro-Premuzic & Furnham, 2006). In fact, studies indicate that measures of cognitive ability may not predict academic performance at higher levels of education (Ackerman, Bowen, Beier, & Kanfer, 2001; Furnham, Chamorro-Premuzic, & McDougall, 2003). Reasoning that cognitive ability may reflect what a student *can* do, whereas personality traits may reflect what a student *will* do (Furnham & Chamorro-Premuzic, 2004), researchers have recently turned attention to understanding how personality traits are related to academic success.

The most dominant model of personality structure in current literature examining personality traits and academic achievement is the Five-Factor model (Costa & McCrae, 1992; McCrae & Costa, 1997). Within this model, the Big Five personality factors of

Extraversion, Neuroticism, Openness to Experience, Agreeableness and Conscientiousness are thought to encompass all the more narrow personality traits existing at lower levels of the personality hierarchy. For example, individuals scoring high on the Extraversion scale possess the narrower traits of sociability and assertiveness. Individuals high on the Neuroticism scale tend to experience negative emotions such as guilt and pessimism, and are characterized by low self-esteem. Individuals with high scores on Openness to Experience tend to be open-minded, less conservative, and possess active imaginations. High scores on Agreeableness reflect tendencies to be sympathetic, altruistic, and helpful, whereas high scores on Conscientiousness are associated with responsibility, persistence, trustworthiness, and being purposeful.

Of the Big Five personality traits, only conscientiousness has consistently been associated with academic achievement (Noftle & Robins, 2007; O'Connor & Paunonen, 2007). A vast amount of research illustrates that conscientious students achieve higher levels of academic success, both in high school (e.g., Lounsbury, Sundstrom, Loveland, & Gibson, 2003; Preckel, Holling, & Vock, 2006; Trautwein, Ludtke, Roberts, Schnyder, & Niggli, 2009) and in university (e.g., Bauer & Liang, 2003; Busato, Prins, Elshout, & Hamaker, 2000; Chamorro-Premuzic & Furnham, 2008; Chamorro-Premuzic & Furnham, 2003; Conard, 2006; Noftle & Robins, 2007; Phillips, Abraham, & Bond, 2003). Although it is assumed that this relationship results from greater motivation (Chamorro-Premuzic & Furnham, 2005) or effort (De Raad & Schouwenburg, 1996) on the part of conscientious students, researchers are only beginning to identify the actual mediating factors underlying the relation between conscientiousness and academic achievement.

Kanfer (1990) has suggested that personality, like cognitive ability, is a trait-like individual characteristic that has a distal relationship to performance, having its influence through state-like individual characteristics that are more proximal to performance. These more proximal determiners of performance are characteristics that are situation specific and malleable over time. This conceptualization of individual difference characteristics, supported through previous work examining the indirect relationship between cognitive ability and performance (e.g., Chen, Gully, Whiteman, & Kilcullin, 2000), provides a framework through which the complex relationship between personality and performance can be examined.

Relatively few studies have attempted to identify the proximal constructs that mediate the relation between personality and academic achievement and several of the studies that have are problematic. For example, Blickle (1996) concluded that this relationship in university students was mediated by learning strategies such as integrating new material into existing knowledge and applying direct effort to learning. However, mediation presupposes an initial significant relationship between the predictor and the dependent variable which disappears when introducing the mediator variables to the model (Baron & Kenny, 1986), a relation that Blickle (1996) failed to find for conscientiousness and exam grades. Using a similar path analysis approach, Schouwenburg and Kossowska (1999) made similar conclusions regarding the role of learning strategies in mediating the relationship between personality traits and academic achievement. However, whereas their study found significant relationships between the Big Five personality traits and various different learning strategies, and significant relationships between those learning strategies and academic achievement, their study failed to show that the introduction of a mediator had any effect on the relationship between personality traits and academic achievement.

In a multi-sample study of university undergraduate students, Noftle and Robins (2007)

met the criteria for mediation, and found that perceived academic ability and academic effort mediated the relationship between conscientiousness and grade point average (GPA), providing preliminary insight into the mediating processes. Effect sizes in this study, although on par with previous research, were relatively small, illustrating the multi-determined nature of academic achievement. Nofle and Robins (2007) argue that many factors, such as values, self-efficacy, attributional style, study and test taking skills, and financial resources, are expected to simultaneously contribute to academic success. Therefore, further research is needed to clarify the mediating process and better illuminate the complex relationship between personality and academic performance.

Any proximal construct that serves as a mediator between conscientiousness and academic performance must be related to both variables. Based on past literature, we have identified four potential candidates to examine within the current study: academic self-efficacy, test anxiety, academic self-handicapping, and learning styles.

According to social cognitive theory, self-efficacy refers to one's belief in one's ability to organize and execute a course of action necessary to successfully accomplish a task (Bandura, 1997). Academic self-efficacy, or a belief in one's academic ability, is thought to be an important contributor to academic success (Klassen, 2004), and empirical studies support this relationship (e.g., Chemers, Hu, & Garcia, 2001; Lane, Lane, & Kyprianou, 2004; Multon, Brown, & Lent, 1991; Nofle & Robins, 2007). Further supporting academic self-efficacy as a potential mediator between conscientiousness and academic achievement is the fact that it is associated with the personality trait of conscientiousness (Lee & Klein, 2002; Nofle & Robins, 2007) and it has been found to mediate the relationship between academic achievement and other trait-like characteristics, such as identity style (Hejazi, Shahraray, Farsinejad, & Asgary, 2009).

Test anxiety is defined as the "set of phenomenological, physiological, and behavioural responses that accompany concern about possible negative consequences or failure on an exam or similar evaluative situation" (Zeidner, 1998, p. 17). Numerous studies indicate that test anxiety is related to academic performance (see Zeidner, 2007 for review). In addition, individual differences in test anxiety are related to trait-like characteristics, such as personality (Chamorro-Premuzic, Ahmetoglu, & Furnham, 2008). Supporting test anxiety as a proximal characteristic related to academic performance are findings that test anxiety fluctuates within an individual, depending on various situational demands such as test complexity, preparation, and value of the outcome of the test (Humphreys & Revelle, 1984).

Academic self-handicapping describes actions, such as procrastinating or putting in little effort, that serve to externalize or excuse failure or to discount negative implications of one's performance to protect self-esteem (Urdu, 2004). Although research indicates that academic self-handicapping is inversely related to both academic performance (e.g., Martin, Marsh, & Debus, 2001; Urdu, 2004; Zuckerman, Kieffer, & Knee, 1998) and the personality trait of conscientiousness (e.g., Ross, Canada, & Rausch, 2002), thus meeting the theoretical criteria for a mediator, no studies to date have examined the interaction between these three constructs. Thus, we examine academic self-handicapping as a proximal characteristic that may mediate the relation between conscientiousness and academic performance.

Lastly, because of the emphasis on learning strategies in previous research, we have included this variable as a fourth potential mediator in the present study (e.g., Blickle, 1996; Schouwenburg & Kossowska, 1999). Biggs, Kember, and Leung (2001) identified two approaches to learning. A deep approach emerges from an intrinsic motivation and a desire

to understand the material. Students with a deep approach to learning engage in behaviours that focus on learning the underlying meaning, associating new ideas to old ideas, and critically synthesizing the material. In contrast, a surface approach to learning stems from an extrinsic motivation, where students rely on rote memorization of material and learn only the essentials to avoid failure. Generally, deep approaches to learning are associated with better academic performance than surface approaches (e.g., Diseth, 2003; Entwistle & Ramsden, 1983; Sadler-Smith, 1997; Thomas & Gadbois, 2007) and the styles of learning used by individuals are thought to be a reflection of their personalities (e.g., Busato et al., 2000; Furnham, 1995; Ramsden, 1988). For example, Diseth (2003) and Zhang (2003) both found that students high in conscientiousness tend to engage more frequently in deep approaches to learning. However, learning styles can also be considered a state-like characteristic (Entwistle, 1988). Many studies illustrate that students adjust their styles of learning depending on situational demands, including the topic area, intentions with regard to learning, and the assessment method used (e.g., Entwistle, Tait, & McCune, 2000; Marton & Saljo, 1976), suggesting a state-like construct. Further, students who are better able to direct, sustain, and evaluate their motivation and strategies tend to achieve greater academic success (Thomas & Gadbois, 2007; Zimmerman & Martinez-Pons, 1986). For this reason, we have used learning style as a proximal characteristic that may mediate the relationship between personality and academic achievement.

Although the relationship between the personality trait of conscientiousness and academic achievement is well established, researchers have suggested that this is not a direct relationship and that more sophisticated methods and analyses are necessary to truly understand the processes underlying personality influences on academic performance (e.g., O'Connor & Paunonen, 2007). The current study used a path analysis model to examine several factors that may mediate this relationship. Consistent with previous research, we predicted a positive relationship between conscientiousness and academic performance, as measured by course grades. Further, we predicted that this distal relation would be mediated by academic self-efficacy, test anxiety and learning strategies, supporting the notion of academic performance as a multi-determined outcome.

Methods

Participants

Two hundred and twenty-three undergraduate university students participated in this study (82 males and 141 females). All students were registered in first year psychology courses and received course credit for their participation. Almost half (49.3%) of the participants were in their first year of university, while 21.5% were in their second year, 15.2% were in their third year, 12.6% were in their fourth year, and 1.3% were in their fifth year of university.

Measures

Background questionnaire. Participants answered questions about their academic background including year of study, program of study, study habits, performance expectations, sex, and age.

The NEO Five-Factor Inventory Scale (NEO). The NEO Five-Factor Inventory Scale – Revised (Costa & McCrae, 1992) measures the Big Five Personality traits in college-aged individuals. Participants respond to 60 statements using a 5-point Likert scale. There are five subscales, each containing 12 items that measure five different personality traits. Costa and McCrae (1992) reported the following Cronbach alpha coefficients for each subscale: Openness to

Experience ($\alpha=.95$), Conscientiousness ($\alpha=.89$), Extraversion ($\alpha=.89$), Agreeableness ($\alpha=.95$) and Neuroticism ($\alpha=.91$). Only Conscientiousness was examined in the present study.

Motivated Strategies for Learning Questionnaire (MSLQ). The Motivated Strategies for Learning Questionnaire (Pintrich & DeGroot, 1990) measures motivational and self-regulated learning strategies related to academic performance. Participants respond to the 44 items using a 7-point Likert scale. Although there are five subscales in the MSLQ, we included only two in the present analyses. These included students' academic self-efficacy ($\alpha=.89$; "I expect to do very well in this class"), and test anxiety ($\alpha=.75$; "I worry a great deal about tests"). Higher scores for each subscale reflect greater tendencies to demonstrate that particular motivation or strategy.

Academic Self-handicapping Scale (ASHS). The Academic Self-Handicapping Scale (Urduan & Midgley, 2001) is a 6-item measure of students' tendencies to engage in academic self-handicapping (e.g., "Some students fool around the night before a test. Then if they don't do well, they can say that is the reason. How true is this of you?"). Participants indicate the degree to which they agree or disagree with each statement using a 5-point Likert scale. Higher scores indicate greater tendencies to self-handicap. The reported Cronbach's alpha coefficient for this scale was .86 (Urduan & Midgley, 2001).

Revised Study Process Questionnaire (SPQ). The Revised Study Process Questionnaire (Biggs, Kember, & Leung, 2001) measures students' approaches to learning. Participants respond to 20 statements using a 5-point Likert scale. From the 20 items, deep learning approaches (established from deep strategy and deep motivation subscales; e.g., "I feel that virtually any topic can be highly interesting once I get into it") and surface learning approaches (established from surface strategy and surface motivation subscales; e.g., "My aim is to pass this course while doing as little work as possible") are obtained. High scores in each case reflect a greater tendency to endorse that learning strategy. Reported Cronbach's alpha coefficients for the deep learning approach and surface learning approach subscales were .73 and .64 respectively (Biggs et al., 2001).

Academic performance. Final grades for the course from which the participant was recruited were used as a measure of academic performance. Numerical final grades ranging from zero to 100, which were composed of exams and short assignments, were used in all data analyses.

Procedure

Participants completed all questionnaires during class time in 50 minutes or less. Questionnaires were administered half way through the semester. All participants completed the background questionnaire first. The order of the remaining questionnaires was varied across participants to eliminate order effects. Final grades were obtained from the participants' instructors after final grades had been officially submitted to the university.

Results

Bivariate correlation coefficients (Pearson's r), means and standard deviations for the central measures are shown in Table 1.

We conceptualized the data in terms of a path analysis with Grades as the main outcome variable. Grades were regressed on two primary variables, Sex and Conscientiousness, and on five mediator variables, Academic Self-Handicapping (Urduan & Midgley, 2001), Surface

and Deep Approaches to study processes as measured by the Study Process Questionnaire (SPQ: Surface Approach and SPQ: Deep Approach) (Biggs, Kember, & Leung, 2001), and two of the four scales of the Motivated Strategies for Learning Questionnaire (Pintrich & De Groot, 1990): Academic Self-Efficacy and Test Anxiety. To complete the path model, each of the mediator variables was regressed onto the primary variables. Table 2 presents total, direct and indirect effects of the primary variables on final grades, and direct effects of the mediator variables on final grades. Figure 1 presents direct effects of all variables on final grades and all relationships between primary and mediator variables.

Primary variables accounted for 13% of the variance in Grades, $R^2(2, 195) = .13$, $F = 14.14$, $p < .001$, and the overall model accounted for 32% of the variance in Grades, $R^2(7, 188) = .32$, $F = 12.77$, $p < .001$, R^2 - change = .19, $F(5, 188) = 10.78$, $p < .001$, see Table 2 and Figure 1.

Table 1. Zero-order correlations among path analysis variables

Variable (label) M (SD)	A	B	C	D	E	F	G	H	I
Sex (A) 0.6 (0.5)	1.0	.03	.12	-.14	-.17	.03	.01	.09	.20
Year of study (B) 2.0 (1.1)		1.0	.19	-.12	.01	-.01	.24	-.16	.17
Conscientiousness (C) 30.4 (6.5)			1.0	-.42	-.29	.37	.40	-.31	.29
Academic self-handicapping (D) 13.2 (5.2)				1.0	.30	-.15	-.30	.26	-.24
SPQ: Surface approach (E) 25.7 (6.5)					1.0	-.30	-.35	.14	-.22
SPQ: Deep approach (F) 27.5 (6.6)						1.0	.32	-.16	.21
MSLQ: Academic self-efficacy (G) 46.8 (9.4)							1.0	-.35	.48
MSLQ: Test anxiety (H) 15.1 (6.5)								1.0	-.39
Grades (I) 78.8 (12.2)									1.0

Note. **Bolded** correlations are significant at $p < .005$

Table 2. Effects of Level 1 and Level 2 Predictor Variables on Grades

<u>Primary Variables</u>	Total	Direct	Indirect
Sex	.17*	.20**	.03
Conscientiousness	.30**	.06	.24**
<u>Mediator Variables</u>			
Academic Self-Handicapping		.02	

SPQ: Surface Approach	-.02
SPQ: Deep Approach	.02
MSLQ: Academic Self-Efficacy	.37**
MSLQ: Test Anxiety	-.23**

Note. All values represent beta weights. * $p < .05$. ** $p < .01$.

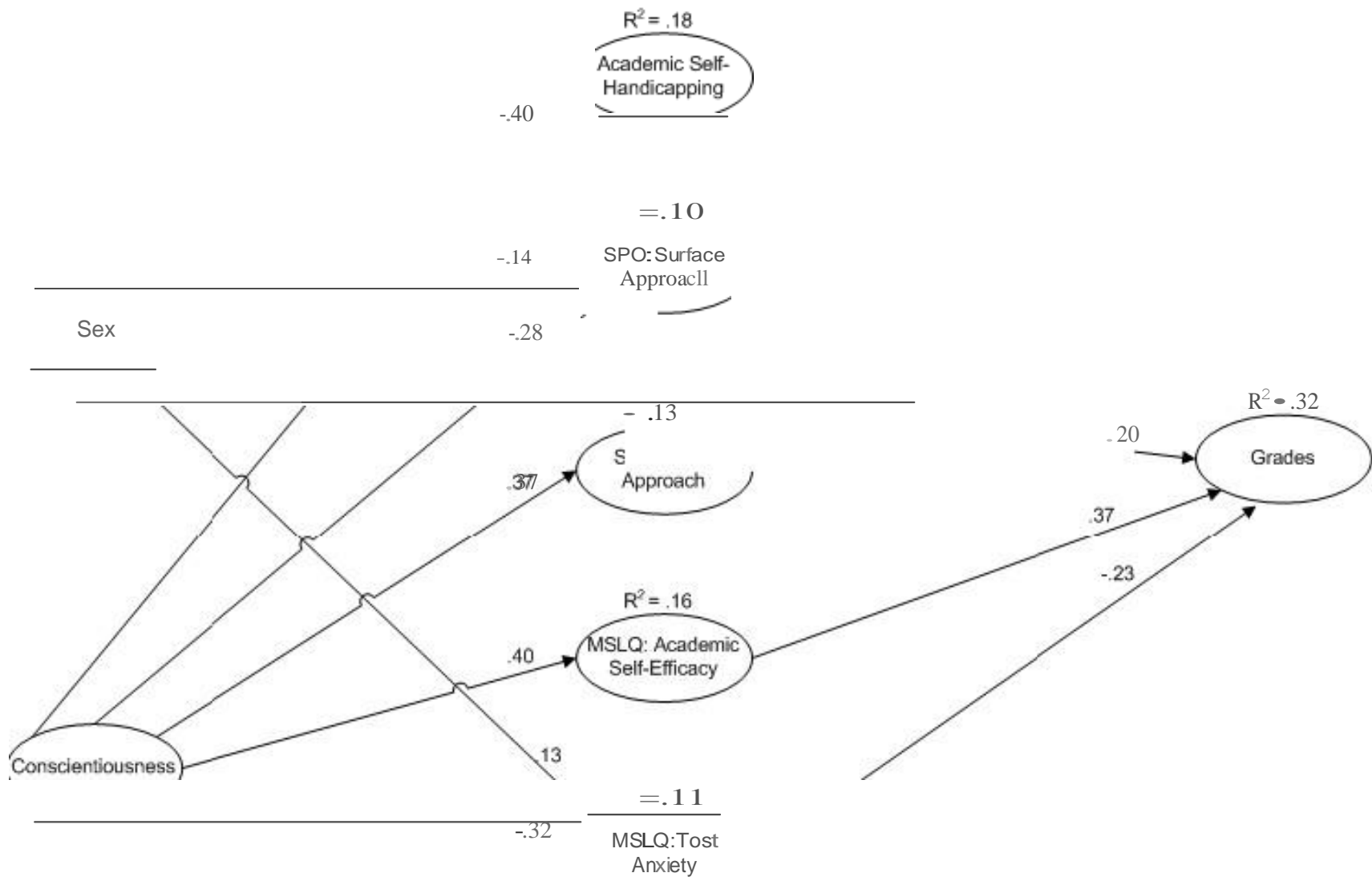


Figure 1: Direct effects of all variables on final grades and all relationships between primary and mediator variables.

At the total effect level, both primary variables were related to Grades: Conscientiousness ($\beta = .30$) and Sex ($\beta = .17$), such that females had higher Grades. After accounting for the mediator variables, the direct relationship between Sex and Grades remained consistent with the total effect ($\beta = .20$), but the direct relationship between Conscientiousness and Grades was diminished to non-significance ($\beta = .06$). Thus, the relationship between Conscientiousness and Grades was indirect ($\beta = .24$). Analysis of this indirect effect indicates that the relationship between Conscientiousness and Grades was mediated by Academic Self-Efficacy (Sobel's $z = 4.05, p < .001$), and Test Anxiety (Sobel's $z = 2.80, p < .001$). Academic self-efficacy had a large positive relationship with Grades ($\beta = .37$), and Test Anxiety was negatively related to Grades ($\beta = -.23$) (Baron & Kenny, 1986; Sobel, 1982).

Discussion

The present study extends prior research by developing a path analysis of the relation between personality traits and academic achievement. Consistent with previous literature (O'Connor & Paunonen, 2007), there was a strong positive relationship between conscientiousness and academic performance. More important, there were two factors that mediated this relationship, Academic Self-Efficacy and Text Anxiety.

Academic Self-Efficacy was positively related to Grades, and Test Anxiety was negatively related to Grades. There were strong relationships between Conscientiousness and each of those factors: a positive relationship with Academic Self-Efficacy and a negative relationship with Test Anxiety. Conscientious students are high in academic self-efficacy, which in turn is strongly predictive of higher grades. Conscientious students are also low in test anxiety, which is in turn negatively related to grades. Thus in the present study, the relationship between Conscientiousness and Grades was entirely mediated by a positive path through Academic Self-Efficacy, and a simultaneous negative path through Test Anxiety.

The present study clearly indicates the importance of Academic Self-Efficacy and Test Anxiety as predictors of academic performance. Conscientiousness was also related to several other learning variables that merit further investigation. There was a negative relationship between Conscientiousness and Academic Self-handicapping, and positive relationships were found between Conscientiousness and the SPQ Deep Approach to learning scale. Given that both academic self-handicapping and deep approaches to learning have previously been found to be related to academic performance, each of these relationships should be examined in future studies given the importance of these learning variables in predicting academic performance. Specifically, different outcome measures should be examined. For example, the outcome measure used in the present study was final course grades. It would be valuable to examine these relationships using other outcome measures of academic success, as the most effective learning style may be dependent on the task requirements and the assessment methods used (Diseth, 2003; Entwistle, Tait, & McCune, 2000). While conscientiousness may be related to academic achievement regardless of how achievement is measured (O'Connor & Paunonen, 2007), the particular learning strategies that mediate this relationship may differ depending on the assessment method. In fact, it is likely that a student who is conscientious would

be well able to adapt their learning strategies to fit the task parameters. This point is further underscored by the fact that Academic Self-Handicapping and the approaches to learning, which have been shown in prior research to relate to learning outcomes, were unrelated to final grades in the current study.

The finding that females in the present study tended to have higher grades was unpredicted but consistent with previous work. This relationship was evident when controlling for year of study, Conscientiousness, and all of the mediator variables. However, this relationship is not as simple as females being "smarter" than males in the academic arena. Previous research suggests that females may engage in more behaviours that are conducive to academic success, including attending classes more regularly (Zusman, Knox, & Lieberman, 2005). Further complicating the interpretation of this relationship is that discipline or subject choice tends to differ between males and females, and different types of learning strategies are more prevalent in some disciplines than others (Smith & Miller, 2005). Future research should address these issues.

General cognitive ability should also be considered. In a recent paper, Chamorro-Premuzic and Furnham (2008) found that the personality traits of Openness to Experience and Conscientiousness mediated the relationship between measures of intelligence and academic performance. These recent findings clearly illustrate the need to examine both ability and personality factors in regards to academic achievement.

Conclusion

The present study supports prior research that conscientiousness is a critical factor with regard to academic performance. Furthermore, the present study indicates that the effects of conscientiousness on academic performance are indirect. Therefore, it seems that mediated relationships between conscientiousness and academic performance are ripe for future study.

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