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The relationship between personality, motivation, learning strategies and academic performance.

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In partial fulfilment of the requirements for the degree of
Master of Arts in Psychology by Course Work and Research
Report

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Declaration

I hereby declare that this research report is my own independent work, and has not been presented for any other degree at any other academic institution, or published in any form.

It is submitted in partial fulfilment of the requirements for the degree of Master of Arts in Psychology by Course Work and Research Report at the University of the Witwatersrand, Johannesburg

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Abstract

Educators, researchers and psychologists have conducted a number of studies to identify factors that contribute towards academic performance. A number of social factors such as socio-economic factors, inequality and intelligence to mention a few have been identified (Mail and Guardian, 2008). Most of these factors tend to focus on social aspects rather than individual attributes, however, evidence from previous studies indicates that academic performance and learning are also influenced by students' motivation, affect and learning strategies (see Pintrich & Schunk, 2002; Pintrich & Maehr, 2004). These individual variables and their role in determining academic performance have not been sufficiently explored in the South African context. This study thus aimed to investigate the relationship between personality, motivation, learning strategies and academic performance and the extent to which the other variables could predict academic performance in a sample of undergraduate psychology students at the University of Witwatersrand, Johannesburg, with the aim of adding to knowledge in the field.

In order to achieve the aims of the study, two instruments measuring personality (the NEO PI-R Questionnaire) and motivation and learning strategies (the Motivated Strategies for Learning Questionnaire) were used. Academic performance was estimated using psychology year marks. A quantitative approach was adopted and two analyses were conducted: a correlational analysis, to identify the relationship between all the variables utilized in the study, and a regression analysis, to ascertain the extent to which motivation, learning strategies and personality predicted academic performance. The analysis was based on a sample of 69 University of the Witwatersrand undergraduate psychology students, although only 26 of these students' psychology marks could be accessed.

Results indicated significant positive relationships between most of the motivational subscales (intrinsic goal orientation, task value and self-efficacy) and most of the learning strategies (elaboration, organization, critical thinking, regulation, time and study environment and effort regulation). Significant negative relationships were found between the motivational variable test anxiety and the learning strategy subscales critical thinking and effort regulation. A similar relationship was found between test anxiety and conscientiousness but a positive significant

relationship was found between test anxiety and neuroticism. Most of the learning strategies and motivational strategies were negatively correlated with neuroticism but positively correlated with conscientiousness and extraversion.

None of the motivational and learning strategy subscales were found by this study to have a significant relationship with academic performance, and only two of the five personality traits - extraversion ($r = 0.411$; $p = 0.036$) and openness to experience ($r = 0.451$; $p = 0.021$) - had significant relationships with academic performance. Only openness to experience ($t = 2.70$; $p = 0.0129$) and self-efficacy ($t = 3.17$; $p = 0.0302$) were predictive of academic performance in the current study.

Despite disappointing findings with regards to the predictive relationships between academic performance and motivation, learning strategies and personality traits, partly as a result of the sample size; the current study nonetheless suggests that these variables may have an important role to play in academic performance. Additional studies are thus needed to further investigate these relationships. The findings were also able to indicate some of the important attributes that could enhance performance within psychology at the University of the Witwatersrand for undergraduate students.

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CHAPTER 1

Introduction

Current studies have indicated that South Africa's graduation rate is about 15%, and is also the lowest in the world. A study that was conducted by the Department of Education in 2005 showed that 30% of students dropped out in their first year and 20% dropped out during their second and third year of study, with only 22% graduating within the specified three years duration of their degree (Letseka & Maile, 2008). According to reports in the Mail & Guardian, "Only 16% of undergraduate students at the University of the Witwatersrand attained general degrees in 2004, falling short of the national benchmark of 25%. Only 13% acquired professional first degrees against a national benchmark of 20%" (Mail & Guardian, 2008, p.2).

South African universities thus have low retention rates and graduation levels as compared to other countries (Huysamen, 1996). According to the Mail and Guardian (2008), some of the reasons for this failure to complete degrees within the specified times are: financial problems, limited resources to assist students in universities and the meagerness of matric results as indicators of tertiary preparedness. Based on this, many previous reports and studies conducted on academic performance have focused on inequalities and economic disadvantage as predictors of performance (social determinants), however, some of these studies have shown that some students who happen to come from disadvantaged backgrounds still manage to succeed (Taylor, 2004). This suggests that it is also necessary to look for other factors that determine academic success to find out what within the students themselves impacts on their academic performance.

Taking this into account, it seems necessary in a context like South Africa to also conduct studies that focus on individual determinants of academic success, such that such knowledge can be used to understand other variables that not only determine success but also bridge the gap and provide understanding of necessary interventions that could help improve students' performance.

Previous studies have illustrated that every aspect of human behaviour is related to learning and motivation and that the way one responds to one's environment is developed through the process of learning (Hergenhahn, 1980). This suggests that there may be an important link between one's personality and the way that one learns, as well as one's level of motivation to learn. Huysamen

(1996) posits that to gain a better understanding of how students learn, it is of importance to study learning strategies since they comprise some of the active processes in learning and understanding.

Research suggests that the relationship between personality and achievement is mediated by learning strategies and other studies have found that there is a direct relationship between learning, academic achievement and personality (Diseth, 2003; Pintrich & Schunk, 2002). The extents of one's motivation and one's learning style and strategies have also been shown to determine the extent to which one achieves (Blicke, 1996; Pintrich & Schunk, 2002; Weinert & Kluwe, 1986). This suggests that it is important to determine the extent to which motivation, learning strategies and personality affect actual performance. This study not only aims at ascertaining whether there is a relationship between the variables, but also at ascertaining the extent to which the variables (motivation, learning strategies and personality) predict academic performance. Investigating these variables could also provide a meaningful way of describing individual achievement and how it is influenced by a number of motivational, cognitive and behavioral outcomes (Pintrich & Schunk, 2002).

Barker and Olson's (1996) study suggests that through data collection activities and use of information from students' records, it may be possible to identify students who might be at-risk of negative outcomes within the education sector. This can then guide interventions to assist students in developing a sense of ownership and motivation towards their learning careers. By gaining a better understanding of the ways in which personality, motivation and learning styles may be linked to each other and to performance in a South African context, it might be possible to develop teaching and learning theories that channel educators and students alike to find ways of creating interventions that would feed into improving their teaching and learning. Research on student learning has the ability to provide classroom instructors, curriculum designers, and institutional planners with vital information for decision-making using psychometrically sound instruments and involving students and faculties (Barker & Olson, 1996). Ultimately, this study may provide data suggesting new ways for students and educators to develop interventions to improve student performance at university.

In recent research there has been growing interest in studies that focus on predictors of academic performance. These studies have developed from a focus on intelligence to focus on psychosocial aspects of academic performance and lately on personality attributes, learning strategies and achievement motivation. Very few, if any, of these kinds of studies have been conducted within the South African context hence a need to focus on variables such as personality, learning strategies, motivation and academic performance to contribute to existing findings. Those studies that have been carried out have focused on intelligence and high school performance (especially Grade 12 results) as predictors of academic success at the tertiary level (cf. Fraser & Killen, 2003; Huysamen, 1996; Taylor, 2004). Huysamen (1996) argues that it is important to investigate other determinants of academic success at the university level in South Africa and that an understanding of determinants of academic success could assist universities to identify students at risk hence designing interventions to assist them as well as developing skills that could improve students' retention and pass rates.

In order to achieve the aims of the study, a quantitative approach was adopted and two inventories used, namely, the Neurotic Extraversion Openness Personality Inventory- Revised (NEO PI-R) and the Motivated Strategies for Learning Questionnaire, as well as a demographic questionnaire. The study thus aimed to explore the relationship between personality (as measured by the NEO PI-R Questionnaire), motivation (as measured by the Motivated Strategies for Learning Questionnaire), learning strategies (as measured by the Motivated Strategies for Learning Questionnaire), and academic achievement/performance (as estimated by psychology marks) in a sample of South African university students. It also aimed to determine if certain personality traits, motivation styles and/or learning strategies preferences could predict academic performance in a sample of undergraduate psychology students.

CHAPTER 2

Theoretical Foundation and Literature Review

The literature review aims to provide a basic conceptualization of the variables investigated and a basis for understanding the contextual arguments for the relationships between the variables based on previous studies. The literature will firstly provide definitions of important terms or variables investigated in the study and their theoretical approaches and later provide information on the relationships that other studies conducted in this area have found. This thus lays the foundation for this study and provides an arena for arguing possible findings for the study.

Theoretical Foundation of Personality

Personality theorists differ in their assumptions about personality. For example, Hergenhahn (1980) states that the term personality comes from the Latin word *persona*, meaning mask. A definition of personality in this sense is derived from the understanding that personality is the component of self that is portrayed selectively to the public but has aspects that remain concealed (Hergenhahn, 1980).

Hergenhahn (1980) argues that most personality theorists describe personality as consistent patterns of behaviour which make it possible to predict one's response to a situation, whilst Child (1968) describes personality as "more or less stable, internal factors that make one person's behaviour consistent from one time to another, and different from the behaviour other people would manifest in comparable situations" (p.83). Morf and Ayduk (2005) perceive personality psychology as a field of study that aims to understand or comprehend how people differ in order to be able to predict how an individual will tend to respond and behave in a given context. They describe personality as "the study of both classes and categories of dispositional tendencies, as well as the processes that underlie and define these tendencies" (Morf & Ayduk, 2005, p. 1). Based on these definitions, personality can be seen as consistent behavioural traits within an individual, which make that individual unique. These behavioral traits are guided by internal underlying factors, which enable one to predict and understand behaviour within contexts (Child, 1968; Hergenhahn, 1980; Morf & Ayduk, 2005).

Personality can also be regarded as the observable aspect of a person and/or as an internal mechanism that controls behaviour. For observable aspects, personality is seen simply as determined by what one does in various situations, thus disregarding hidden components and focusing on observable and empirical evidence, whilst for internal mechanisms, the focus is on underlying drives which may not be observable (Hergenhahn, 1980). Catell (1957) defines personality as “that which permits a prediction of what a person will do in a given situation” (as cited in Hall & Lindzey, 1978, p. 530). By this he means that psychological research in personality should aim to establish laws about what individuals will do in different situations. This study aims to investigate the relationship between personality, learning strategies, motivation and academic success with the objective of finding whether these variables can predict academic success.

Catell (1957) deems personality to concern itself with both overt and covert behaviour, since he conceives behaviour to be fully understood when seen within the larger framework of the entire functioning organism (as cited in Hall & Lindzey, 1978). Trait theory falls in the category of theories that perceive personality as an observable aspect of behaviour, which may be controlled by internal mechanisms. This is the theory that will be adopted for this study.

The trait theory, according to Hergenhahn (1980), purports that if one possesses certain traits; these traits, in turn, determine how one will behave in a given situation, meaning that these traits can, to an extent, predict behavioural tendencies. The main strength of the trait theory unlike other theories is that it can validate hypothesis and is based on measurement. Other theories on the other hand focus on conscious motives that cannot be measured and validated without utilizing the conscious (Bynner, 1972). McCrae and Costa (1994) acknowledge that traits may interact with opportunities at a specific time. They consider issues of temporal stability; arguing that slight change in individuals’ standing on extensive trait categories and global tendencies across time may occur. Morf and Ayduk (2005) concur with McCrae and Costa (1994) asserting that personality is conceived “of as a distribution of behaviours that can be described by both average tendencies (traits), as well as psychological processes involving characteristic responses to situations” (p. 2). This argument ties in with what Hergenhahn (1980) and Child (1968) suggested alluded to.

According to Costa and McCrae (1994), by the age of 30 years personality traits are stable. The stability in personality traits characterizes all the major personality domains; neuroticism, extraversion, openness to experience, agreeableness and conscientiousness (Costa & McCrae, 1994). The observation about the stability in traits can be generalized across age, gender and race but may not be generalized to individuals with dementia and specific psychiatric disorders.

Costa and McCrae (1994) argue that although personality traits are stable, they should not be misunderstood to deem human beings as controlled by forces beyond their control. They clarify this by arguing that personality traits are not routinely defined behaviours but are ‘inherently dynamic’ temperaments that interact with opportunities, challenges and experiences of that context at a moment. They also take into consideration impulsivity and spontaneity in human beings, but separate these attributes from traits, arguing that even though all these factors affect human beings, they are not stable dispositions but are instances that are part and parcel of human nature (Costa & McCrae, 1994).

Personality theorists therefore work from a given context in understanding one’s traits, and propose that this basis provides grounds for possible predictions about how one may respond to a particular situation. An understanding of this process may enable the development of interventions that could help improve human life (Costa & McCrae, 1994). This study aims at developing an understanding of the relationships between the variables studied and investigating the predictability of these relationships such that this can provide feedback for understanding learning and determinants of academic success for future interventions.

This study will adopt the five-factor model as a trait theory since it provides the grounds for the development and emergence of the five traits as measured by the NEO PI-R (Neurotic Extraversion Openness Personality Inventory- Revised).

The Five Factor Model

According to Larsen and Buss (2008), the five-factor model of personality has received the most attention and support from researchers. This model was originally based on the lexical approach and the statistical approach. The lexical approach is an approach that emphasizes the importance

of encoding personality traits as single terms in natural languages (Goldberg, 1993). This approach thus seeks to identify the major personality dimensions by conducting a factor analysis on comprehensive adjectives representing personality traits. Personality traits were identified from the English dictionary and then reduced by being clustered into groups and eliminating where appropriate (Ashton & Lee, 2001; Goldberg, 1993; Larsen & Buss, 2008). According to Larsen and Buss (2008), the five factor model was derived by Fiske (1949) through a factor analysis of Cattell's personality factors and further refined by Tupes and Christal (1961), based on the works of early trait theorists like Allport, Cattell, Eynseck, etc...

The NEO PI-R is the standard instrument used to measure the Big Five factors or traits – namely neuroticism, extraversion, openness to experience, agreeableness and conscientiousness (Ashton & Lee, 2001; De Raad, Perugini, Hrebickova & Szarota, 1998; Larsen & Buss, 2008). These traits have six different facets each (Costa & McCrae, 1994).

Neuroticism assesses an individual's proneness to psychological distress; their emotional adjustment or instability and coping behaviour; it is the degree to which an individual is calm and self-assured as opposed to anxious and lacking in self-confidence. The facets of this subscale are anxiety, angry hostility, depression, self-consciousness, impulsiveness and vulnerability (Costa & McCrae, 1994). Extraversion assesses the extent to which an individual can have interpersonal interaction with others and is sociable and active; it is the degree to which one is sociable and assertive as opposed to being withdrawn and reserved. Its facets are warmth, gregariousness, assertiveness, activity, excitement seeking and positive emotions (Costa & McCrae, 1994). Openness to experience assesses whether an individual is proactive and appreciating of experience or is conventional. It is the degree to which an individual is open to new ideas; imaginative as opposed to narrow-minded. Its facets are fantasy, aesthetics, feelings, actions, ideas and values (Costa & McCrae, 1994).

Agreeableness assesses the quality of an individual's interpersonal orientation; it is the degree to which one is cooperative and helpful to others as opposed to uncooperative and incooperative. Its facets are trust, straightforwardness, altruism, compliance, modesty and tender-mindedness (Costa & McCrae, 1994). Lastly conscientiousness assesses the extent to which an individual is

organized or goal-directed; it is the degree to which one strives to achieve and is disciplined as opposed to disorganized and lacking in discipline. Its facets are competence, order, dutifulness, achievement striving, self-discipline and deliberation (Pervin, 1993; Costa & McCrae, 1985; Larsen & Buss, 2008).

The five- factor model has been shown to be surprisingly replicable in the past twenty years in studies that have conducted the assessment in English and other languages, with different samples and in different formats (Larsen & Buss, 2008; De Raad, 1992; Costa & McCrae, 1994). Scores on the factors have also correlated with those of other instruments such as motivation instruments (Pervin, 1993). Since the NEO PI-R has been found to correlate with scores of other instruments and is said to encompass every aspect of personality (Costa & McCrae, 1994), this study will investigate the extent to which the other variables studied have a relationship with personality and deduce the extent to which they correlate with personality and predict academic performance.

Taylor (2004) posits that the psychometric properties of the basic traits inventory seem to illustrate a promise for future use in cross-cultural contexts. She argues though that some of the facets of the inventory still need to be investigated, especially for positive affectivity for extraversion, straightforwardness, modesty, tender-mindedness and pro-social tendencies for agreeableness, action and value for openness to experience.

The relationship between the five factors and academic performance

Farsides and Woodfield (2003) conducted a correlational analysis on the five factors of the NEO PI-R. Their results illustrated that extraversion was significantly and positively correlated with openness to experience, agreeableness and conscientiousness but negatively associated with neuroticism. Their results also showed a non-significant relationship between academic success and extraversion, neuroticism and agreeableness, a minor significant positive relationship with conscientiousness and a significant positive association with openness to experience (De Fruyt & Mervielde, 1996; Farside & Woodfield, 2003; Hirschberg & Itkin, 1978; Shuerger & Kuma, 1987).

Some studies argue that introversion is associated with academic success for older students, yet others have been equivocal, illustrating inconsistent findings between introversion, extroversion and academic performance. Entwistle (1972) argues that theoretically, stable introverts compared to extroverts are more likely to engage in good study habits, whilst high anxiety drive in introverts could result in unstable study habits, leading to compromised academic performance. Having noted this inconsistency, Entwistle (1972) proposes that when looking at such relationships, it is important to focus on specific disciplines since different disciplines may require different traits and strategies.

It has been argued that the association between academic success and openness to experience can be explained in terms of the association the trait has with crystallized intelligence or in terms of typical rather than maximal performance, since this trait has been found to be highly associated with typical intellectual engagement and also divergent thinking as well as achievement through independence (Brand, 1994; Goff & Ackerman, 1992; Hofstee, 2001; McCrae, Costa & Piedmont, 1993). Studying this relationship could therefore allow one to predict academic achievement in higher education (McCrae et al., 1993). Contrary to this proposal for a strong association between openness to experience and academic performance, other studies have not found a significant relationship and it is argued that intellectual engagement and openness to experience have not demonstrated predictive validity with regards to academic performance (Busato, Prins, Elshout & Hamaker, 2000; Chamorro-Premuzic & Furnham, 2003b; Wolfe & Johnson, 1995).

Chamorro-Premuzic and Furnham (2003b) posited that a low score in openness may actually have positive effects on performance because it is more strongly related to academic achievement than intelligence. They further argued that openness may be more applicable in courses that require artistic imagination and innovation and not in courses defined by systematic rules and organization. Based on this proposition, it may be argued that there could be an expected correlation between these variables in the study based on the assertion that many aspects of psychology are not defined by systematic rule but require one to engage with the material.

Some of the results from previous studies found that students who were conscientious, established, and introverted were more likely to succeed academically in tertiary institutions than students with opposite characteristics (Chamorro-Premuzic & Furnham, 2003b). Diseth (2003) and Dollinger and Orf (1991) found that conscientiousness and openness to experience predicted objective test performance in psychology students and other studies have found positive and predictive relationships between student effort, academic achievement and conscientiousness (Blicke, 1996; Busato et al., 2000; De Raad & Schouwenburg, 1996; Goff & Ackerman, 1992; Wolfe & Johnson, 1995). Diseth's (2003) study, on the other hand, illustrated a relationship between academic achievement and openness but no significant relationship between conscientiousness and academic achievement. Early studies have also attributed better academic performance to introverts because of the tendencies and greater abilities for introverts to consolidate learning. They tend to have lower levels of distractibility and better study habits whilst extraverts tend to be easily distracted, very sociable and impulsive (Chamorro-Premuzic & Furnham, 2003b).

McKenzie (1989) argued that studies that have been conducted to look at the relationship between neuroticism and academic achievement have not been clear. A negative association between academic achievement and neuroticism has been proposed in relation to stress and anxiety under test or examination conditions and impulsiveness has been argued to affect one's learning discipline, however this has been contested (Chamorro-Premuzic & Furnham, 2003a; McKenzie, 1989). Earlier studies have argued an ambiguity in the relationship, suggesting that motivational effects of anxiety in highly intelligent students may be different and possibly positive compared to those students who do not achieve highly academically (Chamorro-Premuzic & Furnham, 2003a). Students higher in neuroticism have also been found to have higher adaptive and problem-solving strategies depending on the strategies they adopt. Based on what McKenzie (1989) found, he concluded that neuroticism could contribute positively and/or negatively to performance but also stated that an interaction between neuroticism and a higher level superego may improve academic performance.

Diseth's (2003) study, unlike other studies, did not illustrate a significant relationship between personality and achievement. His study did not support that learning strategies could mediate

between personality and academic achievement but suggested that learning strategies could be independent predictors of personality; “the five-factor model gives a description of general traits, and may therefore not account for as much variance in academic achievement” (Diseth, 2003, p.153). Diseth’s (2003) study illustrated that there was a relationship between personality and learning approaches on one hand, and on the other hand, illustrated a relationship between learning strategies and achievement but did not show a direct relationship between personality and achievement.

Chamorro-Premuzic and Furnham (2003b), contrary to this, provided results that were consistent with other studies thus supporting that academic success or failure can be predicted by the NEO PI-R inventory. Entwistle (1972) and Catell, Sealy and Sweney (1966) assert that about 25% of the variance in academic performance may be attributed to personality dimensions, especially traits such as conscientiousness, dependability, friendliness and submissiveness. Some studies argue against this proposition, mainly stating that the instruments’ subscales have questionable reliabilities and that the studies’ sample sizes were small. It seems that there is a lot of debate within this field of study, hence providing this study legitimacy, in that it can add to the studies in this field and expand thoughts around the implications of the variables on academic achievement, especially for a South African context.

Ackerman and Heggestad (1997, as cited in Chamorro-Premuzic & Furnham, 2003b) propose a PPKI theory (intelligence as processes, personality, knowledge, and interests) which hypothesizes that personality traits play a significant role in the development of knowledge since they direct one’s choice and level of persistence to engage in activities and be in settings that stimulate one’s mental capacity. This theory symbolizes an effort amongst researchers to incorporate a theoretical framework for understanding the relationship between cognitive and non-cognitive differences underlying the attainment of knowledge (Chamorro-Premuzic & Furnham, 2003b). “The theory of PPKI thus implies that individual differences in personality may influence academic performance (which is essentially a measure of field-specific knowledge) and, indeed, studies have shown that ‘non-intellectual’ factors such as personality traits and learning styles are significantly involved in academic performance” (Chamorro-Premuzic & Furnham, 2003, p. 238).

The above paragraph argues that personality and learning strategies have an impact on performance. This lays a foundation for the study and provides a basis for the next section of the literature, which firstly develops a contextual understanding of learning strategies and later discusses the relationship between learning strategies and academic performance.

Theoretical Foundation of Learning

Learning approaches have been studied since the 1800s. According to Weinert and Kluwe (1987) Hermann Ebbinghaus (1885), the founder of modern learning research, suggested that the goal of learning psychology should be to formulate general laws of learning regardless of specific knowledge and to obtain an understanding of the nature of human beings and human memory. These approaches were originally behaviourist in nature; deeming the teacher as one who played a central role in learning and the learner as an object that could be controlled and who did not play a major role in learning. Little attention was given to the learners' cognitive processes (Weinert & Kluwe, 1987).

After years of empirical studies, researchers came to note that even when external conditions were controlled, individuals differed in learning and memory. To solve this dilemma, researchers started developing "empirically definable, static individual difference parameters, such as IQ, which could be inserted into general formulas to describe learning" (Hull, 1945, as cited in Weinert & Kluwe, 1987). Later on there were developments in studies that emphasized individual differences in learning effectiveness, such studies investigated the classification of memory abilities, motivational and social influences on recall, the relationship between personality and learning, developmental differences in learning and memory etcetera...(Weinert & Kluwe, 1987).

In the nineteen fifties, researchers began to change their approach in studying learning to include theories of memory and cognition. These theories still focused on creating general and universal laws of learning but were more orientated towards learning effectiveness. In the nineteen seventies, researchers began to move away from using psychometric tests to classify learning capabilities and started to analyze cognitive processes and structures and use psychometric tests to assist them in identifying processes involved in learning and utilizing understanding to benefit

learning (Weinert & Kluwe, 1987). From this focus grew cognitive psychology, which then noted the importance of the students' role in learning. Learning became understood as an activity that involves an active construction of information and as oriented towards a certain goal and a learner became conceived of as actively engaged in the construction of information in ways that are meaningful to the processor of the information (Weinert & Kluwe, 1987). Learning became defined as a "relatively permanent change in behaviour or behavioural potentiality that comes from experience and cannot be attributed to temporary body states" (Hergenhahn, 1982, pp.14-15).

There are many theories of how learning occurs but this study will adopt Bandura's (1977) social learning theory, which emphasizes that what individuals learn is attained from the interaction they have with others and the environment. Bronfenbrenner (1979) argued that the interaction between personal and environmental factors is important in understanding human experiences. In particular, he emphasised that an individual's interpretation and attribution of environmental cues is predictive of their psychological or emotional experiences.

According to Bandura (1997), in social learning theory causal inferences are conceptualized of in terms of reciprocal determinism. Viewed from this perspective, psychological functioning "...involves a continuous reciprocal interaction between behavioral, cognitive and environmental influences" (p.344). Social learning theory integrates learning and motivation (Bandura, 1977), as per the Motivated Strategies for Learning Questionnaire – one of the adopted instruments for this study. It integrates learning with personality, arguing that personality development focuses on how one learns to become the person he or she is therefore providing reasons for why people behave the way they do (Maltby & Macaskill, 2007). It also conceives of learning as self regulated; that through interaction with the environment, a person not only learns to adopt and adapt but to also structure the environment to suit his or her needs.

According to Bandura (1977), for an individual to be motivated, control an action or for learning to be effective, that individual should have learnt of the incentives or consequences that accompany behaviour, which motivate or demotivate certain behavioural tendencies. He calls this the anticipatory capacity, which is that which has been learnt from past experience hence creating certain expectations that certain actions will bring about certain benefits in the future

(Bandura, 1977). He perceives the awareness or anticipatory capacity as a human attribute that makes it easier to record consequences of actions (Maltby & Macaskill, 2007).

A learner within the social cognitive approach and Bandura's social learning theory, as alluded to before, is viewed as active in learning and a meaning maker of information he or she interacts with. The next part of the literature will build from these approaches and discuss learning strategies as behavioural tendencies learners adopt to actively engage in learning.

Learning strategies

Oxford and Green (1990) define learning strategies as "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self directed, more effective, and more transferable to new situations" (p.1). They conceive of the word strategy as related to conscious planning, control and manipulation and as goal driven. This conception is similar to how learning is conceived of within cognitive psychology (Weinert & Kluwe, 1987).

Diseth (2003) defines learning strategies as learning approaches or relatively stable orientations to studying or habitual ways of embarking on assignments. He describes learning strategies as defined by the way one adjusts oneself to situational demands based on what one perceives as task demands (Diseth, 2003). Learning strategies are thus methods used by people to engage in the learning process and are content and context specific as well as student-dependent. Learning strategies are also understood as behavioural reflections that influence the encoding process one engages in during learning (Weinstein & Mayer, 1986). This definition takes into cognizance the role of mental cognition in making sense of information, thus the individual is perceived as playing an active role in constructing meaning around the information received. These conceptions of learning strategies grew from the social learning theory, which emphasizes learning as active, constructive and based on the reciprocal interaction between behavioral, cognitive and environmental aspects (Bandura, 1977; Weinstein & Mayer, 1986).

This study will adopt Pintrich's conceptions of learning strategies; the self-regulated learning strategies approach. The self-regulated learning (SRL) perspective, according to Pintrich (2004), is broader and more reflective of current theory and research since it not only focuses on cognitive aspects of learning but also motivational, affective and contextual factors, as compared

to other learning perspectives such as the information processing (IP) approach and the student approaches to learning (SAL). This perspective has stronger empirical underpinning based on the multiple current studies on self-regulation and self-regulated learning (Boekaerts & Niemivirta, 2000; Boekaerts, Pintrich & Zeidner, 2000; Pintrich, 2004). The SRL perspective derives its constructs “from an analysis and application of psychological models of cognition, motivation, and learning” (Pintrich, 2004, p.288).

The self-regulated learning perspective is based on four general assumptions (Pintrich, 2004); namely: (1) the active, constructive assumption, (2) the potential for control assumption, (3) the goal, criterion, or standard assumption, and (4) the assumption that self-regulatory activities are mediators between personal and contextual characteristics and actual achievement.

The active constructive assumption is based on the social constructivist and cognitive approach that views learners as active participants in the construction of information in the external environment and also views them as capable of constructing meaning based on what is readily available to them and the information received from an external source (Pintrich, 2004). The potential for control assumption perceives learners as capable of monitoring, controlling and regulating certain characteristics of their environment, mental capacity, motivation and behaviour, yet also takes cognizance of biological, developmental, contextual and individual differences that can affect regulation.

The assumption on standards or goals assumes that there is a certain standard or criteria against which certain goals are measured to assess the extent to which learning occurs or has occurred. Based on the standards, this assumption supposes that the standards are monitored, adapted and regulated such that goals are attained (Pintrich, 2004). The fourth assumption that self-regulatory activities are mediators between personal and contextual characteristics and actual achievement posits that one’s predisposition on its own is insufficient in influencing achievement but argues that self-regulation of cognition, motivation and behavior act as mediators between the individual, the environment and achievement (Pintrich, 2004).

Pintrich (1999) describes three general categories of learning strategies; the cognitive, the meta-cognitive, and the self-regulatory and resource management strategies. Cognitive learning

strategies relate to academic performance in the classroom (Weinstein & Mayer, 1986). These include rehearsal (recitation), elaboration (reorganization of material and connecting ideas) and organizational strategies (selection of main themes from text) (Pintrich, 1999; Weinstein & Mayer, 1986). These strategies can be applied to both simple and complex tasks, from memorizing to comprehending (Pintrich, 1999). Rehearsal is assumed to assist students in attending and selecting important information to be stored in the working memory whilst organizational strategies are assumed to lead to deeper understanding than rehearsal strategies because of their ability to be selective in organizing main ideas from text (Pintrich, 1999).

Weinert and Kluwe (1986) define meta-cognition as that which refers mainly to memory functioning; “it refers to the acquisition of knowledge, the amount of knowledge, and the assumptions and opinions about the states and activities of the human mind” (p. 31). Pintrich, Wolters and Baxter (1999) suggest that one should limit meta-cognitive knowledge to variables such as students’ knowledge about self, task and strategy (Pintrich, 1999, p. 461). Pintrich (1999) highlighted this to clear the confusion within previous studies in distinguishing between meta-cognitive knowledge and awareness and meta-cognitive control and self-regulation. Self-regulation generally refers to the monitoring, control and self-regulation of one’s cognitive tasks and actual behavior, whereas meta-cognitive knowledge and awareness refers to the knowledge that is specifically related to cognition, which individuals acquire as they grow, and this is limited to knowledge about self, task and strategy (Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Weinert & Kluwe, 1987; Zimmerman & Martinez-Pons, 1988).

The knowledge of person variable pertains to “acquired knowledge and beliefs that concern what human beings are like as cognitive (affective, motivational, perceptual, etc) organisms” (Weinert & Kluwe, 1987, p. 22). This variable is subdivided into three categories, intra-individual, inter-individual and universal individual. The intra-individual level focuses on the knowledge or belief about one’s interest, capabilities and propensities related to certain tasks or behaviours. The inter-individual level focuses on how one compares oneself with others, and the universal level focuses on one’s perceptions and intuition of how the human mind works and how one makes use of this knowledge to manage one’s life.

The knowledge of task variable pertains to the lessons learned by an individual about the nature of information encountered and how the information needs to be processed, taking into cognizance its limits and effects (Weinert & Kluwe, 1987). The knowledge of strategy pertains to cognitive procedures for achieving various goals (Weinert & Kluwe, 1987). These strategies are categorized into cognitive and meta-cognitive strategies. Cognitive strategies are perceived as procedures that mainly assist one to reach a goal while meta-cognitive strategies are perceived as strategies that move beyond achieving the goal towards mastery, understanding and asserting that the goal has been adequately achieved (Weinert & Kluwe, 1987). These meta-cognitive knowledge strategies always interact and intuition about these interactions is acquired through experience (Weinert & Kluwe, 1987).

Most cognitive control or self-regulatory strategy approaches generally include planning (setting of goals and standards for studying), monitoring (weighing or comparing behaviour to the goals and standards established) and regulation (controlling of or shaping of one's behaviour to be in line with the standards and goals established)

Resource management strategies pertain to strategies students use to handle and control their environment and other individuals; such as time management, management and control of the study environment and ones' effort (Pintrich, 1999; Weinstein & Mayer, 1986). These strategies are assumed to assist students adapt to their environment and change it to suit their needs and goals.

It is important to recognize that students' use of particular strategies is also linked to their level of involvement with the task or approach to learning, which in turn links to their motivation. Biggs (1987) proposed three approaches to learning, as described by Diseth (2003). These are, the deep learning approach, the surface learning approach and the strategic learning approach. The deep learning approach is an approach towards learning that focuses on the understanding of material; the ability to apply self and provide evidence or illustrations of the material studied. Surface learning is described as that which focuses on rote learning and regurgitation with the fear that deviation from this might lead to failure, and strategic learning is described as an approach to learning that encompasses deep and surface learning approaches but which is primarily motivated by the drive to achieve the best results possible through the management of

time and the learning environment (Diseth, 2003; Sadler-Smith, 1997). Central to the learning approaches and strategies are “the motives’ or ‘interest in learning and achievement’. Diseth (2003) asserts that the central features of the deep approach, surface approach and strategic approach are intrinsic motivation, fear of failure and achievement respectively.

Having laid a foundation for learning strategies, the following section will provide arguments from different studies on the relationships between learning strategies and academic performance.

The relationship between learning strategies and academic performance

An important aspect of learning and academic performance within the classroom context is the self-regulation of cognition and behaviour (Pintrich & De Groot, 1990). Pintrich and De Groot (1990) argue that of all the different components of self-regulated learning, meta-cognitive strategies, management and control strategies and cognitive strategies used in learning, remembering and understanding course material are the most important strategies for academic performance (Pintrich & De Groot, 1990). Cognitive strategies that foster an active engagement in learning have been deemed to result in higher academic performance levels (Weinstein & Mayer, 1986; Pintrich & De Groot, 1990). It is extremely important to keep in mind that acknowledging the important aspects promoting achievement is necessary but not sufficient to ensure higher academic performance - the challenge is for students to be motivated to utilize learning strategies and regulate their thoughts and effort in ways that are driven towards an academic goal (Pintrich & De Groot, 1990).

There have been inconsistent findings on the relationship between learning strategies and academic performance (Blicke, 1996; Busato et al., 2000; Pintrich and Garcia, 1991; Schiefele, 1994). Blicke (1996)’s study found that the most adverse strategies that affected performance were elaborative strategies because the nature of elaboration tends to create confusion (Blicke, 1996). Contrary to Blicke (1996), Pintrich and Garcia (1991) and Schiefele (1994)’s studies found that all the learning strategies had positive effects on academic performance and John (2004) found that self-efficacy, academic experiences, and learning approaches had direct positive effects on self-reported academic ability. Busato et al. (2000) did not find a relationship between any of the learning strategies and academic performance even though, similarly to other

research studies, they found a negative relationship between academic performance and undirected learning. According to Busato et al. (2000), the policy within the context within which the study was conducted may have affected the results. It was argued that the context within which the study was conducted was a context that did not favor a traditional academic climate.

The policy of the Dutch Ministry of Education for the last years, as Busato et al. (1998) noted, is more characterized by cuts in expenditure than by a long-term, educational vision. This policy has resulted to date in a less traditional academic climate. Busato et al. (1998) suggested, based on comparable research by Watkins and Hattie (1985) that deep level learning strategies are probably just not required (anymore) to satisfy examination requirements (Busato, et al., 2000, p.1065).

Busato, et al. (2000) therefore argue that interpreting the results from the study to mean that utilizing any form of studying method, surface or deep, has no connotations for academic success may be ill informed if one does not take note of the contextual issues. They also posit that deep learning is important to consider for meaningful long-term learning purposes, especially since undirected learning has been shown to have significant negative effects on academic success (Busato et al., 2000).

The inconsistent findings on the relationship between learning strategies and achievement could be as a result of the different contexts and courses in which the studies are conducted, the learning intentions, students' state of maturity and course content. Basically, students may adopt different learning approaches based on the content of the course, requirements of the course, the nature of assessments and on what motivates them to learn (Diseth, 2003).

The context of learning expected within psychology is one that would require students to apply their understanding and that challenges students to think. The assignments students are given ensure that students are able to critically engage with theory and illustrate understanding of the theoretical concepts. Cognitive and meta-cognitive strategies, such as organization, critical thinking and regulation would probably be required in order for students to perform well academically. Strategies such as elaboration and rehearsal could have either an adverse effect or

a minor effect on performance (Pintrich, 1999; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Weinstein & Mayer, 1986).

Although based on the research it seems plausible to consider deep learning strategies as a factor contributing to better performance, there is generally a varying relationship between academic performance and learning strategies. This can be as a result of the different instruments adopted and the differences in course requirements for different subjects, which tend to be different for each study. Blicke (1996) argued that this might also be a result of unreliable measures for learning strategies. Even though this has been proposed, the instruments used for this study were able to bridge the gap since they have been deemed reliable.

As important as learning strategies are in terms of their impact on academic performance, so is the level of involvement with the task. This level of involvement has been argued to be related to motivation, which may contribute to the achievement level. The following section will develop a contextual understanding of motivation and then discuss the relationship between learning strategies and academic performance based on previous studies.

Theoretical Foundation for Motivation

According to Pintrich and Schunk (2002), the word motivation is derived from the Latin verb ‘movere’, which means to move. Motivation involves an act, which can be physical (such as effort and persistence) or mental (such as planning, rehearsing, organizing, problem solving, etc...) or both (Pintrich & Schunk, 2002). The description of motivation is related to the defining features of learning strategies, as stated by Pintrich (1999) and Diseth (2003). This infers a relationship between learning strategies and motivation, as proposed by Pintrich (2003).

Bandura (1997) defines motivation as a broad concept that covers a system of self-regulatory mechanisms, which interlinks with what Pintrich (2003) asserts; namely that there is a specific relationship between self-regulatory learning strategies and motivation because in essence both variables are self-regulatory mechanisms. Bandura (1997) argues that self-directed learning requires motivation, other cognitive strategies as well as self denial.

Bandura (1997) proposes that in any attempt to explain the behavioural sources that lead to motivation, one must be able to specify the mechanisms that ascertain, interfere and govern the main features of motivation, such as selection, activation and behaviour that is directed and sustained towards a specific goal. This also ties up with the way learning has been defined as goal-directed behaviour.

Consistent with motivational research, motivation is defined as the process whereby purpose driven activity is initiated and sustained (Pintrich & Schunk, 2002). This definition describes motivation as a process rather than an artifact and as something that cannot be directly observed but is inferred from certain goal-directed behaviours. According to Pintrich and Schunk (2002), having goal-directed behaviours does not necessitate well-formulated goals since goals can change with experience but simply means that one has objectives one tries to accomplish, or obstacles one tries to circumvent. These things one tries to achieve or avoid are based on personal learning and reinforcement histories (Ames, 1990). Pintrich and Schunk (2002) assert that motivational processes are critical elements in sustaining goals; determining a goal, on the other hand, is conceived of as a step towards committing.

The attribution theory will be adopted for this study since it provides a good basis for the motivation variable as per the MSLQ. This theory is “a cognitive theory of motivation and is based on a general ‘god-like’ metaphor of the individual (Weiner, 1985) that suggests that individuals are conscious and rational decision makers” (Pintrich & Schunk, 2002, p.94). This theory is based on two assumptions; (1) an understanding of and mastery of oneself and the context are goals that motivate people, and (2) individuals are naïve scientists who try to understand their surrounding environment and the causal determinants of their own and others’ behaviour (Pintrich & Schunk, 2002). The underlying assumptions of this theory are based on the premise that contextual and individual factors are antecedent conditions that influence the perceived conditions of an event. The contextual factor includes perceptions and previous experiences of the context and social norms, whereas the individual factors include perceptions of self, beliefs, past experiences and knowledge in relation to an environmental context or similar contexts (Pintrich & Schunk, 2002).

According to Pintrich and Schunk (2002), the motivation to understand and master the environment enables individuals to be able to predict and control their environment hence the drive to know is driven by the drive to effectively manage oneself and the environment. The search for mastery, on the other hand, functions as a tool for seeking understanding and insight (Pintrich & Schunk, 2002).

The attribution theory does not argue against the pleasure principle as posited by Atkinson (1964), who classified people as motivated either by seeking success or avoiding failure; for example, he stated that research on motivation illustrates that motivation for success seekers increases seeking success after failure, but this seeking decreases for failure avoiders. This theory rather suggests that individuals do not always adhere to this principle. This theory therefore does not merely perceive people as passive responders but as active and adaptive learners (Pintrich & Schunk, 2002). This theory concurs with the social learning theory, in that it views individuals playing an active role in learning and in making decisions.

Pintrich and Schunk (2002) caution that attributed causes are perceptual rather than actual. Even though these causes are perceptual, they still play a significant role because they have psychological and behavioural consequences; “attribution theory is a phenomenological theory of motivation that gives precedence to the individual’s construction of reality, not reality per se, in line with other constructive accounts of cognition and learning” (p.95). These attributed causes are posited to have psychological impacts on expectancy for success and self-efficacy beliefs, which in turn impact on one’s affect and actual behavior (Pintrich & Schunk, 2002). This proposition provides a ground for the relationship between motivation and learning as well as achievement.

Bandura (1997), as alluded to before, conceives of motivation as self-directed learning, and proposes that it includes multiple integrated self-referent processes, such as self-monitoring, self-efficacy appraisal, personal goal setting, outcome expectations and affective self-reactions. He further asserts that if one devotes oneself to academic activities, the different motivational components support one’s inclination towards those activities (Bandura, 1997). Zimmerman (1990) proposes that for individuals to be able to regulate their motivational and social

determinants of their academic and mental functioning, they need to learn to select and organize their situation in ways that are driven towards a learning goal.

According to Busato et al. (2000), the degree of motivation within the educational setting has been termed achievement motivation, meaning the propensity for one to strive towards success. De Raad and Schouwenburg (1996, as cited in Busato, et al., 2000) posit that since constructs from achievement motivation, learning styles and personality are based on different conceptual and contextual objectives and are measured by overlapping variables, it becomes difficult to draw conclusions as to which variables play an important role in education. They thus propose, "...it may be profitable to perform an integrated study with all the possible basic traits put together in a coherent system" (p. 316). This study may not be able to investigate this but this may serve as a possible suggestion for future studies.

Pintrich (1999) introduced three general models of motivation relevant for learning, namely; self-efficacy belief, task value belief and goal orientation belief, which are tested by the MSLQ. These motivational beliefs focus on ones' judgment of the ability to do a certain task, ones' interest or value awarded to the task, as well as whether the focus is internal or external to the one doing the task, respectively. Self-efficacy involves ones' judgment about their abilities to complete a certain task and ones' actions in specific situations as well as the confidence in ones' cognitive skills to learn and perform an academic task (Pintrich, 1999; Schunk, 1985).

Task value focuses on an individuals' perception of the importance of the task or its salience; it also focuses on personal interest and attitude towards the task, which is ultimately stable and which is a function of individual characteristics. Task value also focuses on the long-term effects and utilization of the task (Pintrich, 1999).

Goal orientation is understood as the reasons behind one's pursuit of an achievement task rather than the performance objectives, it is said to reflect a "a type of standard by which individuals judge their performance and success or failure in reaching that goal" (Pintrich, 2000a, 2000c, 2000d, as cited in Pintrich & Schunk, 2002, p. 214). Goal orientation is defined as "an integrated pattern of beliefs that leads to different ways of approaching, engaging in, and responding to achievement situations" (Ames, 1992b, p. 261, as cited in Pintrich & Schunk, 2002, p. 214). It thus depicts the patterns in which beliefs can manifest themselves.

Goal orientation approaches focus on cognitive goals, which are context specific and fit well with the self-regulated learning theory since they assume that there must be some goals, standards or criterion with which students assess themselves in order to self-regulate learning, performance and behavior (Pintrich, 1999; Pintrich & Schunk, 2002). The goal orientation types that will be discussed are the intrinsic and extrinsic goal orientations, which can also be referred to as mastery and performance goals or task focused and ability focused goals respectively.

Mastery goal orientation is an orientation towards improvement, development of new skills, understanding, competency and insight whilst performance goal orientation is an orientation towards a demonstration of competency relative to others or surpassing normative standards and seeking recognition (Pintrich & Schunk, 2002; Weinert & Kluwe, 1986). Mastery goal orientation has been posited to be positively associated with self-regulatory strategies such as time management, effort regulation and adaptive help-seeking behavior (Weinert & Kluwe, 1986).

Mastery goal orientation compared to performance goal orientation is associated with positive adaptive patterns and tends to attribute performance outcomes to effort, and effort to ability (Pintrich & Schunk, 2002). Performance goal oriented students perceive effort and ability as inversely related and tend to adopt or develop a sense of learned helplessness if their self-efficacy or confidence related to academic tasks is low. Inversely, students with a performance goal orientation as well as self-efficacy in their abilities could develop an adaptive pattern thus seeking challenging tasks (Pintrich & Schunk, 2002; Weinert and Kluwe, 1986). This paragraph ties with the next section which provides arguments on the relationships between motivation, learning strategies, personality and academic performance.

The relationship between academic performance, learning strategies and motivation

Studies that investigated the relationship between efficacy and the different types of goal orientation have found inconsistent findings, some illustrating positive relationships between self-efficacy and mastery goal orientation, and others positive relationships between self-efficacy and performance goal orientation (Kaplan & Midgley, 1997 as cited in Pintrich & Schunk, 2002; Skaalvik, 1997, as cited in Pintrich & Schunk, 2002). Pintrich & Schunk (2002)

assert that there is a likelihood that students who have a performance goal orientation would tend to have self-efficacy as long as they still manage to best others and demonstrate high ability.

Harackiewicz, Barron & Elliott (1998) found that there was an increase in intrinsic motivation and task involvement for students who adopted the performance goal orientation and had high achievement motivation. They thus suggest that both performance and mastery goal orientation can increase a student's interest and level of involvement depending on personal characteristics and the context in which the task is undertaken. Generally, there seems to be a positive relationship between interest and performance goal orientation and task value and mastery goal orientation (Skaalvik, 1997 as cited in Pintrich & Schunk, 2002; Wolters, Yu & Pintrich, 1996, as cited in Pintrich & Schunk, 2002).

Previous studies have also found that students who adopt a mastery goal orientation tend to report monitoring their cognition and striving to understand and become aware of their learning and tend to use various cognitive strategies such as elaboration, organization and regulation. Mastery goal orientation tends to be related to high task value beliefs (Butler, 1987; Harackiewicz, et al., 1998; Stipek & Kowalski, 1989) and negatively associated with surface processing strategies like rehearsal, especially for university students (Ames & Archer, 1988; Dweck & Leggett, 1988; Meece & Holt, 1993; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Pintrich & Schrauben, 1992; Pintrich, Roeser & De Groot, 1994; Pintrich, 1999b; Wolters, Yu & Pintrich, 1996, as cited in Pintrich & Schunk, 2002).

There have been consistent negative relationships between performance goal orientation and deeper processing approaches in previous studies. Pintrich and Schunk (2002) argue that students adopting this approach may tend to utilize less time and effort on deeper processing. Kaplan and Midgley (1997, as cited in Pintrich & Schunk, 2002) found no relationship between performance goal orientation and adaptive learning strategies but a positive relationship with maladaptive learning strategies. Barker and Olson (1996) found that students tended to move away from intrinsic goal orientation and towards test and grade orientation but overall discovered that students who understood the learning process and actually enjoyed and focused on intrinsic aspects of their education performed better than those who were driven by external motives.

Based on these arguments, it is evident that even though some studies may not argue for a clear negative relationship between extrinsic motivation and academic performance, there are other indirect indicators which may impede academic performance for students that are extrinsically motivated.

Barron and Harackiewicz (2000), contrary to other studies, found that mastery goals were not related to achieving higher grades but were related to interest in the course, and performance goals were related to higher achievement and not to interest in a university context. They also argue that performance goals did not have a negative impact on interest. The context in which goals are pursued, the type of classroom environment and the method of assessing competence may have an effect on goal orientation and its impact on achievement (Barron & Harackiewicz, 2000; Harackiewicz & Sansone, 1991). Even though Barron and Harackiewicz's (2000) results illustrate independent relationships between performance and mastery goal orientation, these authors conclusively state that both performance and interest are important and ultimate aspects that promote sustainable student outcomes.

Boggiano and Barrett (1985) concur with Atkinson (1964) and Pintrich and Schunk (2002) as they assert that students with internalized motivation are less likely to accept negative side effects of artificial reinforcement, which then emphasizes the point that internalized motivation serves as a better motivation tool than extrinsic motivation since one creates internalized meaning about what one wants to achieve (Atkinson, 1964; Boggiano & Barrett, 1985). Internalized or intrinsic motivation, as defined by Deci and Ryan (1986), occurs when an activity ensures that basic human needs for competence and control are met; satisfaction is a consequent from the task. This activity also has to be interesting for its own sake.

Extrinsic motivation, on the other hand, has been defined as something outside of or extrinsic to an activity and/or something extrinsic to the person (Deci & Ryan, 1986). Sansone and Harackiewicz (2000) argue that self-determined extrinsic motivation may play a similar role to intrinsic motivation depending on the extent to which the external attribute is influenced by the person or by others.

Ames (1990) proposes that motivation is an attribute of personality and Ryan and Connell (1989) argue that students who internalize their motivation to learn tend to display numerous characteristics (which do not deviate from one's personality traits) related to successful learning such as higher self-esteem, more self-confidence and a better ability to cope with failure (Ryan, Connell & Grolnick, 1992). Ames (1990) further proposes that individuals who focus on effective intrinsic reinforcers and make internal and controllable attributions for their successes and failures perform better than persons with lower achievement-orientations. Ames (1990) proposes a relationship between personality and motivation, which this study aims to investigate, and Pintrich and Schunk (2002) suggest that trait psychology has played a significant role in the evolution of motivation theories from behavioural to cognitively based theories.

Previous studies have found a positive relationship between self-efficacy and self-regulated learning (Pintrich, 1989 cited in Pintrich & Maehr, 2004; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Pintrich, 1999). These studies found that students high in self-efficacy were likely to report using all three types of cognitive strategies (rehearsal, elaboration and organization). Those high in self-efficacy, contrary to those low in self-efficacy, were more likely to be cognitively involved in learning even if the strategies were not of a deep level comprehension. Self-efficacy was also related to self-regulatory strategies such as planning, monitoring and regulation and also strongly related to academic performance (Pintrich, 1999).

Le, Casillas, Robbins and Langley's (2005) study found that academic performance and retention were both predicted by academic self-efficacy, and academic goals. Academic performance was additionally predicted by achievement motivation, and college retention or persistence was additionally predicted by institutional commitment, academic related skills, social support and social involvement (Le et al., 2005). From this study "Robbins et al. (2004) proposed that the composite of psychosocial and academic-related skill predictors were best understood by three higher order constructs: motivation, academic-related skills, and social engagement" (Le et al., 2005, p. 483). Even though this study is not investigating retention, it is important for this study to acknowledge some of the variables that contribute towards students' sustenance as they might have an indirect influence on academic performance and contextual issues within institutions.

Task value beliefs as motivation factors relevant for learning were positively correlated with cognitive strategies (Pintrich, 1999). Students high in task value belief and reporting higher interest levels in the task compared to those reporting lower interest and value were more likely to report using learning strategies to monitor and control their cognition. This factor was also correlated with academic performance even though the relationships were not as strong as those for self-efficacy (Pintrich, 1999).

Pintrich and Garcia (1991)'s study found strong positive relationships between mastery or intrinsic goal orientation and cognitive strategies and self-regulatory strategies. Mastery was comparatively related to performance. Consistent negative relations were observed between extrinsic goal orientation and self-regulated learning and performance. Even though these results were observed, Pintrich and Garcia (1991) argue that a concern about getting good grades may to an extent motivate college students to attend lectures and increase the motivation to engage with coursework, hence contributing towards performance. They argue that even if this may not be a good motivator, it may improve grades for college students (Pintrich and Garcia, 1991). Poor performance of students may either be caused by a lack of skills or be a result of the fact that the student possesses the skills but lacks the confidence to accomplish tasks (Bandura, 1997).

The variance in academic performance and the process by which traits can influence examination results can be explained by variables such as personality, intelligence, and vocational interests (Chamorro-Premuzic & Furnham, 2003b). Previous studies have found significant relationships between academic performance and factors such as personality traits and learning strategies and styles (Busato et al., 2000; Chamorro-Premuzic & Furnham, 2003b; De Fruyt & Mervielde, 1996). It is thus important to look at what other studies have found re the variables studied hence the next section will discuss literature from other studies re variables that impact on academic performance.

The relationship between learning strategies, personality traits, motivation and academic performance

Blicke (1996) conducted a study which illustrated that there was no direct relationship between learning strategies and personality traits but which found that one and the same trait can have

different effects on performance. Diseth's (2003) study, like Blicke's (1996), found that the relationships between personality factors and performance can have varied effects:

... Openness to Experience covaries positively with the learning strategy 'critical evaluation' as well as with the learning strategy 'making relationships'. On the other hand, 'critical evaluation' covaries with performance in the same direction, whereas the learning strategy 'making relationships' covaries in the opposite direction. The result is that the effects of the two learning strategies on college grades cancel each other out. Thus learning strategies seem to be mediators between basic personality traits and performance (Blicke, 1996, p. 350).

This suggests that personality traits influence one's motivation to adopt certain learning strategies, which in turn have an effect on performance hence learning strategies can be conceived of as mediators between personality and academic performance (Blicke, 1996). Diseth's (2003) study found that personality does not directly influence performance but that motivation and learning strategies played a major role (mediator role) in the relationship between personality and academic achievement (Diseth, 2003).

Pintrich and De Groot (1990) conceive of self-regulated learning as going hand in hand with motivation. They propose that the three self-regulated learning strategies are linked with three motivational components, namely; an expectancy component, a value component and an affective component. The expectancy component focuses on perceptions of the ability to perform on a task, the value component focuses on interests and perceptions about the significance of the task and the affective focuses on emotions connoted with the task. According to Pintrich and De Groot (1990), studies generally suggest that students high in the expectancy component usually engage in learning strategies promoting understanding and active involvement with the task, hence they perform better than those lower in expectancy.

According to Weinert and Kluwe (1986), an attempt to integrate motivation and meta-cognition means relating,

... theoretical concepts concerned with knowledge about self, performance expectation and monitoring of one's actions as perceived in the meta-cognition literature with concepts such as self-perceptions of ability, expectations of success and fear of failure, causal attributions for success and failure, and processes of self-evaluation, from the motivation research domain (p. 11).

Earlier studies on motivation and meta-cognition had conceived of motivation and cognition as concepts that were independent of each other, yet recent studies have proposed a relationship arguing that despite the differences in how motivation and meta-cognition are perceived, there are valid and similar predictions concerning performance and behavior (Peterson & Seligman, 1986; Stipek & Weisz, 1981). It is argued that good meta-cognitive strategies coupled with helpless attributional styles may have an effect on achievement and behaviour hence Weinert & Kluwe (1986) posit that a study of this nature is important in understanding determinants of learning and performance since it illustrates the extent to which emotions are involved in behavioural tendencies and actual performances. Weinert and Kluwe (1986) perceive cognition, meta-cognition, procedural skills and motivation factors to be important predictors of learning and achievement. These variables proposed by Weinert and Kluwe (1986) have been adopted in formulating the Motivated Strategies for Learning Questionnaire.

Based on the arguments that have been made, it can be deduced that motivation is seen as the force that drives students to make use of particular learning strategies, which may help them achieve. Furthermore, both the level of motivation and the selection of particular strategies depend on particular personality traits (or behavioural patterns) that the individual student possesses. This also illustrates that all three aspects impact on academic performance, directly or indirectly.

This part of the study has been able to provide information which provides a basic conceptualization of the variables investigated and the basis for understanding the context of the research. It has also been able to provide arguments based on previous studies for the relationships between the variables investigated hence has been able to lay the foundation for this study and provide an arena for arguing possible findings. The following part of this study will focus on the research questions and methods adopted for the current study. The research questions focus on whether there are relationships between the variables studied as well as the extent to which the variables studied can predict academic performance. These questions will be answered through the analysis and discussion.

Research Questions

1. Are personality factors, motivation and learning strategies related to each other and to academic performance (in psychology) in a sample of psychology undergraduate students?
2. To what degree do these variables (motivation, learning strategies and personality) predict academic performance (in psychology) in a sample of psychology undergraduate students?

CHAPTER 3

Methodology

Research design

This study employed a quantitative method of analysis since it aimed at looking at quantifiable relationships utilising interval scales of measure. Quantitative research aims at quantifying constructs and assigning numbers to perceived qualities of things; variables are used to describe and analyse human behaviour and also to control sources of error in research (Babbie & Mouton, 2005). The variables that were utilized for this study were personality, as assessed by the Revised NEO Personality Inventory (NEO PI-R), motivation and learning strategies, as assessed by the Motivated Strategies for Learning Questionnaire (MSLQ) and achievement/performance, as assessed by students' psychology marks.

This study adopted a non-experimental correlational research design. According to Nachmias and Nachmias (1976), this design is used in instances where manipulation is impossible or unethical. The correlation design questions a sample of individuals about their properties and characteristics (Nachmias & Nachmias, 1976). Participants were administered questionnaires which measure a number of variables to establish whether there were relationships between the variables. This research was not interested in finding causal links but was interested in exploring the extent of the relationships between specific variables, and in using the results to guide teaching and learning.

Sampling technique

A non-probability convenient sampling technique was used for this study. This sampling technique selects a number of cases that are conveniently available. Singleton, Straits and Straits (1993) describe this sampling technique as “a matter of catch-as-catch-can” (p. 160). This study aimed to administer questionnaires to any undergraduate student studying psychology that was willing to participate. Hence only those students who were willing to participate in the study were used and the sample characteristics were thus dependent on the willingness of students to participate. Singleton, Straits and Straits (1993) state that even though this sampling technique is convenient, efficient and inexpensive; it can be difficult to draw inferences from such a sample.

Sample

The sample consisted of undergraduate students from the University of the Witwatersrand, Johannesburg studying psychology. A total of 275 questionnaires were distributed to undergraduate first, second and third year psychology students at the University of the Witwatersrand, Johannesburg in lecture halls and tutorial rooms. Of the 275 questionnaires distributed, only 75 were returned completed, representing a 27.3% response rate. Of the 75 questionnaires returned, 69 could be used for analysis, as the rest had not been sufficiently completed.

Of the 69 participants, 16 were male and 53 were female. The participants' ages ranged from 17 to 35 years ($M = 20.69$; $S = 3.25$). Most of the participants were non-white; with 42 non-whites and 27 whites. The non-white group consisted of Africans ($n = 43$), Asians ($n=1$), Coloureds ($n=2$) and Indians ($n=3$). There were 23 (33.3%) English speaking and 46 (66.7%) non-English speaking participants; the latter group's home languages were Afrikaans ($n=1$), Chinese ($n=1$), Gujarati ($n=1$), isiXhosa ($n=7$), isiZulu ($n=13$), Siswati ($n=9$), Sepedi ($n=2$), seSotho ($n=5$), seTswana ($n=3$), Tshivenda ($n=2$), Tsonga ($n=1$) and Yugoslav ($n=1$). The sample consisted of 38 (55%) first year, 9 (13%) second year and 22 (32%) third year students. Of these students, 24 (35%) had no interest in pursuing a career in psychology and 45 (65%) were interested in pursuing a career in psychology.

Instruments

Predictors of academic or college success have been a topic for a long time within educational psychology (cf. Hezlett et al., 2001; Le et al., 2005). Such studies have both theoretical and practical significance; theoretically "the identification of higher order factors associated with college success would shed light on students' behaviours in college. Practically, these factors could assist colleges by targeting key areas for developmental intervention to reduce both the academic and the persistence "risk" of entering students" (Le et al., 2005, pp. 482-483). Even though studies have been conducted to find predictors of academic performance, Le et al. (2005) argues that the conceptual underpinnings of the predictors make it difficult to develop a multidimensional inventory with a strong psychometric and theoretical framework. This study has thus taken care to provide a detailed underpinning of the theoretical aspects of the variables

and measures used. All the measures are based on sound theoretical foundations and have been shown to be reliable and valid instruments, which have had years of reviewing.

This study made use of three instruments, namely; a demographic questionnaire, the Revised NEO Personality Inventory (NEO PI-R) and the Motivated Strategies for Learning Questionnaire (MSLQ).

Demographic Questionnaire

A brief self-developed demographic questionnaire (please see Appendix B) was used to assess demographic variables such as age, gender, race, year of study, home language and intention to pursue a career in psychology. These demographic variables were used to describe the sample, developing a background or contextual understanding of the sample.

Academic performance, as represented by students' psychology marks, was also assessed in the demographic questionnaire. A separate page requesting students to provide their student numbers was included, this helped link student numbers to participants' psychology results. Ethical and procedural considerations were made very clear to student participants (please see Procedure, Ethics and Appendices for details). Pintrich (1999) argues that the MSLQ was not designed to assess students' global motivation and self-regulation and that it is sufficiently sensitive to detect differences in motivation and self-regulation as functions of different tasks within classrooms. Having noted this, this study selected psychology as an area of study because the instrument is sensitive to context; meaning that courses that depend on systematic rule application and those that require knowledge application may provide different findings and affect the results of the study.

Revised NEO Personality Inventory (NEO PI-R)

(This questionnaire has not been attached to the research report as it is copyrighted)

The Revised NEO Personality Inventory (NEO PI-R) is a professional psychological assessment tool that measures normal personality traits and can be used in both clinical and research settings. It was designed by Costa, T.P. and McCrae, R.R. yet the assessment tool was as a result of the work of many personality psychologists and psychometricians, especially those whose work led

to the development of the five factor model of personality (Costa & McCrae, 1992a). It has two versions; form S (self report) and form R (observer ratings). This study utilized form-S which is self-administered and which consists of 240 items answered on a 5-point scale (Costa & McCrae, 1992b).

The Revised NEO Personality Inventory has five scales, which measure five major personality domains: Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness (C). The latter two scales are global scales. The five scales have been developed and refined over a period of 15 years of intensive research and refined through the utilization of rational and factor analytical methods (Costa & McCrae, 1992b).

According to Costa and McCrae (1992b), the personality inventory can be administered by hand or computer administered and takes about 30 to 40 minutes to complete (Costa & McCrae, 1992b). The reading level required for one to complete the inventory is the sixth grade hence administering this inventory to university undergraduate students is not problematic. The inventory has strengths in its ability to be comprehensive, which according to Costa & McCrae (1992b) makes systematic research possible.

Internal consistency reliability for the individual scales ranges from 0.56 to 0.81 for the self reports and test-retest reliability scores for the 5 facets conducted in a sample of college students ranged from 0.75 to 0.83 (Costa & McCrae, 1992a). They assert that other studies have found similar values for both sexes in clinical settings and in students. The NEO PI-R also has established content and construct validity. After factor analysis was done, the items loaded on each other and had significant correlation coefficients, providing meaningfulness in the scales. The inventory is also supported by literature about previous personality studies (Costa & McCrae, 1992a).

Motivated Strategies for Learning Questionnaire (MSLQ)

(Please see Appendix D)

The Motivated Strategies for Learning Questionnaire (MSLQ) is an instrument designed to measure the motivational approaches students adopt as well as the different learning strategies they use, with the ultimate goal

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In your document, select the words to include in the table of contents, and then in the Formatting Palette under Styles, click a heading style. Repeat for each heading that you want to include, and then insert the table of contents in your document. You can also create a table of contents by clicking the Create with Manual Formatting option and then type the entries manually. of helping students improve learning (Pintrich, Smith, Garcia & McKeachie, 1991). The final version of the instrument underwent 10 years of development and review (Duncan & McKeachie, 2005).

The MSLQ is based on approaches that adopt the social-cognitive perspective of motivation and self-regulated learning hence it is proposed that the ability to self regulate learning activities is associated with students' motivation in the sense that motivation and learning strategies are not fixed characteristics but are characteristics that can be learned and controlled by an individual (Duncan & McKeachie, 2005). This approach to motivation and learning strategies proposes that motivation is influenced by one's interest and the extent to which one believes in his or her worth (self-efficacy), which can also influence learning strategies depending on the nature of what one is engaging in, in relation to one's interest and character (Duncan & McKeachie, 2005).

The MSLQ takes approximately ten to fifteen minutes to complete. It consists of 81 items and has 15 subscales which are divided according to the motivation and learning strategies components, with 6 measuring motivation and 9 measuring learning strategies. The questionnaire is rated on a 7-point likert scale, where 1 means (*not at all true of me*) and 7 means (*very true of me*).

“The motivation section consists of 31 items that assess students' goals and value beliefs for a course, their beliefs about their skill to succeed in a course, and their anxiety about tests in a course. The learning strategy section includes 31 items regarding students' use of different cognitive and metacognitive strategies. In addition, “the learning strategies section includes 19 items concerning student management of different resources” (Pintrich & De Groot, 1991, p. 5 cited in Artino, 2007, p. 5). These components measure intrinsic motivation, extrinsic motivation, task evaluation, control of learning beliefs, self-efficacy, test anxiety, rehearsal strategies, elaboration strategies, organization strategies, critical thinking, meta-cognitive self-

regulation, time and study environment, effort regulation, peer learning, and help seeking (Barker & Olson, 1996).

In a study by Artino (2007), internal consistency estimates of reliability were conducted. Cronbach's Alpha Coefficients of greater than 0.7 for 9 of the 15 subscales for learning and performance were found, with the largest Alpha of 0.93 for self-efficacy. For the six other scales whose Alpha was lower than 0.7, the lowest Alpha was 0.52. The MSLQ has been argued to be a reliable instrument for measuring learning strategies and has been under development and review for more than 10 years.

To account for the validity of the instrument and its construct, factor analysis was conducted and results of confirmatory factor analysis illustrated that there was reasonable factor validity for both motivation and learning strategies (Artino, 2007). Predictive validity was determined by correlating students' final course grades with the two MSLQ subscales; the results were significant thus demonstrating predictive validity (Artino, 2007). Validation studies have also found several of the scales to be significantly correlated with high achievement in undergraduate course work (Barker & Olson, 1996).

Procedure

The data was collected utilising three questionnaires as discussed in the instrument section. The questionnaires were administered to students studying undergraduate psychology at the University of the Witwatersrand in lecture halls and tutorial rooms.

After permission was obtained to carry out the study from the relevant ethical committee and the Faculty of Humanities, permission was obtained from each year-level coordinator in the Department of Psychology to approach students at the start or end of a lecture or tutorial to invite participants to take part in the study. Once permission was granted, lecturers and tutors were approached to arrange a time that was suitable.

A brief summary of the purpose of the study was presented to prospective participants and they were asked to participate. Before questionnaires were handed to the participants, they were briefed on the procedures, their rights and ethical considerations verbally and in written form.

They were asked to return the questionnaires complete or incomplete to ensure the integrity of the tests was maintained and were made aware of the ethics guiding the plea to return questionnaires. Those that showed interest were given the questionnaires and asked to return them in a box that was placed in the first year office, the main office or to give them to their lecturers even if they were not completed.

The participants were given a set of questionnaires in a pack with the participant information sheet (please see Appendix A) attached. Participants were asked to detach and keep the information sheet. The information sheet provided details of the study, an invitation to participate and details on what participation entailed; ethical standards guiding the study were included as well as contact details for the researcher and supervisor.

In the demographic questionnaire, a separate sheet asking for participants' student numbers (please see Appendix C) was provided to obtain students' final psychology marks. This represented the variable academic performance. This sheet provided details on how confidentiality would be ensured in linking the student numbers to the psychology marks.

Students were informed that in order to access their psychology marks, they would be asked to provide their student number for this purpose only. It was emphasized that this was optional and that they could participate in the study without providing a student number and/or choose not to participate without negative consequences. Students were directed to a four-digit code at the top of each page of the questionnaire pack received (these were given to students randomly). They were informed that the sheet with student numbers would be detached and given to a person with no direct links to them. This independent person was given a spreadsheet with only the four-digit code, the student number and the year of study to locate and add final student marks to the spreadsheet.

The column with student numbers was deleted before the spreadsheet was returned to the researcher. In this way, only the independent person knew which marks related to which student number (no actual student names were used at any point in the process), but this person was not able to link marks to responses to questionnaires. The researcher did not have access to students'

marks, and could only link questionnaire results and student marks by the four-digit code. In this way, participants' anonymity and confidentiality were ensured.

Participants were asked to complete the questionnaires and return them. After the participants had filled in the questionnaires, they were asked to place the questionnaires in a sealed box in the main office of the Department of Psychology, the first year office or give them to their lecturers. Another sealed box was placed in the lecture rooms or tutorial rooms and if students did not return questionnaires within two weeks they were reminded to return them even if they were incomplete. Once the questionnaires were returned, they were later viewed by the researcher to assess whether they were answered properly and consistently. They were then captured by the researcher, coded and analyzed.

Ethical considerations

To gain entry into the psychology population, a letter explaining the purpose of the study and requesting permission was issued to year level coordinators and, if requested, to lecturers who provided access to students. Students were also provided with a detailed informed consent sheet explaining the study's purposes and procedure. The aims, procedures, advantages or disadvantages of participating in this research and researcher's contact details were provided. Ethics guiding the research were communicated to students through the detailed information sheet before completion of the questionnaire to ensure the implications of the study were clearly communicated and understood. Issues of confidentiality, withdrawal and non-coercion were addressed. Research procedures and possible risk factors of being part of the research were also discussed (Babbie & Mouton, 2005). Completion and return of the questionnaires was taken as consent to participate in the study.

Anonymity and confidentiality were discussed and assured. The questionnaires did not require primary identification such as name but a code was used to link the student number to the marks. The marks were not directly accessed by the researcher. Instead each questionnaire pack was assigned a random code which was used by an independent party to link marks to test results. The student number was then removed, ensuring that the researcher did not see both the marks and the student number together and thus ensuring confidentiality. The researcher only dealt with codes and there was no point in time when the researcher made contact with the student number

and the marks together. This was clearly explained to the participants before participation and before the agreement to fill in the extra attachment where student numbers had to be filled in.

As participation was voluntary, students that did not wish to participate were assured that their decision not to participate would not affect them or their marks in any way. They were informed that only the researcher and the research supervisor would have access to the data. The data was kept safe and was not accessible to any other person other than the researcher and the supervisor and all the questionnaires will be destroyed after completion of the study to ensure no other person has access to them.

There were no identified dangers that could affect participation but if students encountered any problems as a result of participation, participants were referred to the Emthonjeni Centre or Career Counselling Development Unit at the University of the Witwatersrand where they could receive counselling. The researcher's contact details were also provided should the participants need any information concerning or affecting the research. Permission to carry out the study was obtained from the University of the Witwatersrand's Human Research Ethics Committee (Clearance number: MPSYC/08/002IH).

Data Analysis

After the questionnaires were administered they were captured by the researcher using Microsoft Excel then transported to SAS. The responses on the demographic questionnaire and scores on both the NEO PI-R and the MSLQ were analysed accordingly using the SAS programme. Several statistical analytical tests were selected to answer the different questions in this study.

Firstly, descriptive statistics were reported; these provided a description of the sample as well as a description of the data: means, standard deviations, extreme scores and the shapes of distributions (Howell, 1997).

To specifically answer the research questions other statistical techniques were used, such as correlations to test the relationships between the variables studied and regression to test the degree to which the independent variables could predict the dependent variable. Before selecting

these tests, it was important to ascertain the extent to which the data met certain parametric assumptions as such information plays an important role in selecting the appropriate statistical technique. These assumptions are based on whether the sample used for data analysis is randomly selected and whether there is homogeneity of variance. They are also based on the nature of the scale of measure, the extremity of scores as well as the nature of the distribution (Dancey & Reidy, 2004). It was already known that the instruments used for the analysis were interval scales, yet it was still important to ascertain whether there were no extreme scores and that the data was normally distributed (Howell, 1999). Histograms and Kolmogorov- Smirnov tests were used to ascertain the distribution of the data. If the p-value of the Kolmogorov- Smirnov test was $p > 0.05$, the distribution was deemed sufficiently normal and most scores in the histograms had to lie within the centre for the distribution in the histogram to be deemed not extreme (Dancey & Reidy, 2004).

Having ascertained the nature of the data and whether it had met certain parametric assumptions, it was important to determine whether the tests utilized for this study were consistently measuring what they ought to measure. Cronbach's Alpha Coefficients were calculated for the MSLQ and the NEO PI-R subscales with the aim of assessing the reliability based on inter-correlations amongst items per subscale (Murphy & Davidshofer, 2001). Reliability ensures that important conclusions are made from results since one is able to ascertain that the items within each subscale are consistent in what they measure (Singleton, Straits & Straits, 1993).

After testing for normality, the proper statistical analytic techniques were selected to investigate whether a relationship existed between the variables studied. Correlation techniques were used to measure the degree to which the variables studied, namely; motivation, learning strategies, personality and academic performance, were related to each other (Salkind, 2000). Correlations illustrate the strength of the relationship, the direction of the relationship and the significance of the relationship (Dancey & Reidy, 2004). The Pearson's Product-Moment Correlation Coefficient, which is a parametric technique, and the Spearman's Rank Correlation Coefficient, which is a non-parametric technique, were used to test whether there were significant relationships between learning strategies, motivation, personality and academic performance.

This study thus carried out both parametric and non-parametric analyses for the correlations. According to Dancey and Reidy (2004) there is preference for parametric tests to be used whenever their assumptions have not been grossly violated because the nature of parametric tests makes them more powerful than non-parametric tests in that they use more information from the data, such as mean, standard deviation and measurement of error variance, whilst non-parametric tests are based on frequencies and ranking of data (Dancey & Reidy, 2004).

Pearson's Product-Moment Correlation Coefficients were calculated and reported for all of the variables in the study. However, since some of the scales were not normally distributed, Spearman's Rank Correlation Coefficients were also calculated for those variables. Pearson's calculations were reported when analyzing the results of the study and the Spearman's calculations were compared with the Pearson's. In cases where major differences were observed in the results, this was reported. However, both sets of results are available in Appendix G.

Multiple regression was utilized in order to investigate whether any of the independent variables, namely; motivation, learning strategies and personality, predicted the dependent variable, academic performance. This statistical test provides information on how independent variables impact on the dependent variable. This test also provides information about the strength of the relationship, the direction of the relationship, the significance of the relationships and the regression model and enables one to establish which independent variable has the most important influence on the dependent variable (Dancey & Reidy, 2004; Singleton, Straits & Straits, 1993).

The forward selection regression method was utilized for this study. This method selects the independent variables in order of their strength relative to the dependent variable, leaving out variables that do not add value to the model (Dancey & Reidy, 2004). From this, it can be noted that only those variables deemed by the model to have a significant effect on the dependent variable will be reported in the regression analysis. The full fitted multiple regression model was also utilized in the study. This model reports all the relationships between variables without selecting any variable deemed to add value to the model.

These analyses were based on the two research questions, namely: whether there was a relationship between the variables investigated in the study and whether motivation, learning strategies and personality could predict academic performance. The results of these analyses are reported in the next chapter.

CHAPTER 4

Results

In order to address the research questions, this chapter will present statistical results of the current study based on analyses that were conducted and will also provide a brief discussion of the results. It will begin by providing descriptive statistical results which will establish the general distribution of the data to understand whether the data meets certain parametric standards. This chapter will also provide results on the consistency of the measurement instruments used, the extent of the relationships between the variables used as well as the degree to which the dependent variable (academic performance) can be predicted by the independent variables (personality, motivation and learning strategies).

Descriptive Statistics

Basic descriptive statistics for the measuring instruments will be presented in the tables below. These will comprise of the number of participants, the mean, standard deviation, minimum and maximum scores as well as the Kolmogorov-Smirnov test indicating the degree of normality of the distribution. Table 1.1 and 1.2 present descriptive statistics of the variables studied.

Table: 1.1 Means, standard deviations, minimum, maximum and normality tests for the Motivation and Learning Strategies subscales

Scale	N	Min	Max	Mean	STD	Kolmogorov -Smirnov
Value component						
Intrinsic Goal Orientation	69	8	28	19.3	5.5	>0.15
Extrinsic Goal Orientation	69	11	28	20.8	4.7	0.021
Task Value	69	12	42	34.6	6.6	<0.01
Expectancy component						
Self-efficacy for learning & performance	69	17	56	43.1	8.2	>0.15
Control of Learning Belief	69	10	28	23.2	4.2	<0.01
Affective component						
Test Anxiety	69	5	35	18.3	8.5	0.065
Cognitive & meta-cognitive strategies						
Rehearsal	69	5	28	18.7	5.1	0.062
Elaboration	69	14	42	31.9	7.2	>0.15
Organization	69	8	28	20.8	4.8	0.129
Critical thinking	69	5	35	25.2	6.8	<0.01
Regulation	69	30	75	54.4	11.0	>0.15
Resource management strategies						
Time & Study Environment	69	26	50	36.4	6.0	>0.15
Effort Regulation	69	9	28	20.8	5.3	<0.01
Peer Learning	69	3	21	11.0	5.2	<0.01

Help seeking	69	4	28	16.6	5.8	>0.15
Academic performance	26	27.5	86.5	61.3	14.8	>0.15

Results presented in Table 1.1 indicate that 69 participants completed the MSLQ, which measured motivation and learning strategies. The mean and standard deviation for the motivation subscales were as follows: intrinsic goal orientation ($M = 19.3$, $s = 5.5$); extrinsic goal orientation ($M = 20.8$, $s = 4.7$); task value ($M = 34.6$, $s = 6.6$); self-efficacy for learning and performance ($M = 43.1$, $s = 8.2$); control of learning belief ($M = 23.2$, $s = 4.2$); and test anxiety ($M = 18.3$; $s = 8.5$). According to the Kolmogorov- Smirnov results, extrinsic goal orientation, task value and control of learning belief had non-normal distributions, as they were significant at $p = 0.05$. Intrinsic goal orientation, self-efficacy and test anxiety had normal distributions ($p > 0.15$).

Table 1.1 also indicates that the means and standard deviations for the learning strategies were as follows: rehearsal ($M = 18.7$, $s = 5.1$); elaboration ($M = 31.9$, $s = 7.2$); organization ($M = 20.8$, $s = 4.8$); critical thinking ($\bar{x} = 25.2$, $s = 6.8$); regulation ($M = 54.4$, $s = 11.0$); time and study environment ($M = 36.4$, $s = 6.0$); effort regulation ($\bar{x} = 20.8$, $s = 5.3$); peer learning ($M = 11.0$, $s = 5.2$) and help seeking ($M = 16.6$, $s = 5.8$). Critical thinking, effort regulation and peer learning had non-normal distributions at $p = 0.05$, according to the Kolmogorov- Smirnov test, and rehearsal, elaboration, organization, regulation, time and study environment and help seeking had normal distributions.

Although some of the variables did not have a normal distributions according to the results of the Kolmogorov–Smirnov tests, a closer examination of the histograms for these variables suggested that extrinsic goal orientation, task value and control of learning were distributed in a roughly symmetrical fashion (indicating a certain amount of normality), while effort regulation, critical thinking and peer learning were heavily skewed and thus could not be considered normally distributed (Howell, 1999).

Table 1.1 also indicates that 26 of the 69 students' marks were accessible for analysis in this study, with a minimum score of 27.5 and a maximum score of 86.5. This score is based on the average score of psychology results from the two semesters. Academic performance was

normally distributed as indicated by both the Kolmogorov-Smirnov test ($p > 0.15$) and the histogram, with an average or mean of 61.3 and a standard deviation of 14.8.

Table: 1.2 Means, standard deviations, minimum, maximum and normality tests for the NEO PI-R subscales

Scale	N	Min	Max	Mean	STD	Kolmo_Sminorv
Neuroticism		27	152	96.9	24.9	0.029
N1: Anxiety	69	3	30	17.7	5.31	0.019
N2: Angry Hostility	69	5	26	16.3	4.81	0.098
N3: Depression	69	4	31	17.6	6.17	>0.15
N4: Self-Consciousness	69	4	28	16.9	5.17	>0.15
N5: Impulsiveness	69	7	27	16.4	3.99	>0.15
N6: Vulnerability	69	0	26	12.1	5.47	0.077
Extraversion		53	131	110.2	22.1	0.136
E1: Warmth	69	5	30	21.1	5.09	>0.15
E2: Gregariousness	69	2	29	16.4	5.29	0.136
E3: Assertiveness	69	2	28	17.0	5.21	0.118
E4: Activity	69	6	28	17.2	3.96	>0.15
E5: Excitement Seeking	69	5	29	18.2	4.89	0.121
E6: Positive Emotions	69	8	30	20.3	5.41	0.018
Openness to Experience		53	158	119.1	20.3	>0.15
O1: Fantasy	69	3	32	19.9	5.6	>0.15
O2: Aesthetics	69	4	30	21.3	5.3	0.019
O3: Feelings	69	13	32	22.2	4.6	>0.15
O4: Actions	69	4	25	15.8	4.1	0.048
O5: Ideas	69	7	32	20.6	5.5	>0.15
O6: Values	69	9	32	19.4	4.6	>0.15
Agreeableness		52	146	110.3	18.2	>0.15
A1: Trust	69	0	31	15.3	5.9	0.071
A2: Straightforwardness	69	6	31	18.8	5.5	0.091
A3: Altruism	69	9	31	21.5	4.2	>0.15
A4: Compliance	69	5	29	16.4	4.9	>0.15
A5: Modesty	69	3	29	18.2	4.8	>0.15
A6: Tender-Mindedness	69	12	28	20.3	3.6	>0.15
Conscientiousness		56	176	116.5	25.8	>0.15
C1: Competence	69	6	31	20.3	4.7	0.066
C2: Order	69	5	32	18.6	5.1	0.066
C3: Dutifulness	69	5	31	20.4	5.2	0.139
C4: Achievement	69	4	30	19.5	5.2	>0.15
C5: Self-Discipline	69	7	32	18.9	5.8	>0.15
C6: Deliberation	69	9	32	18.9	4.9	>0.15

Note: Each of the five scales has 48 items; the subscales have eight items each

The results from Table 1.2 present descriptive statistics for the NEO PI- R traits and subscales. Even though these subscales are presented in the table above, they will not be discussed in detail as they will not be used for further analysis; only the five traits will be discussed.

The mean and standard deviation for the personality traits were as follows: neuroticism ($M=96.9$; $s=24.9$); extraversion ($M=110.2$; $SD=22.1$); openness to experience ($M=119.1$; $SD=20.3$); agreeableness ($M=110.5$; $SD=18.2$) and conscientiousness ($M=116.5$; $SD=25.8$). Table 1.2 also indicates that all of the personality traits were normally distributed based on Kolmogorov-Smirnov results, except for neuroticism ($p=0.029$), however a closer examination of the histogram for neuroticism indicated that it was roughly symmetrically distributed, and thus had a degree of normality (Howell, 1999).

From the descriptive statistics, it can be gathered that the dependent variable (academic performance) was normally distributed as well as most of the independent variables (MSLQ and NEO PI-R subscales). All the personality traits were normally distributed except for Neuroticism and only three of the six non-normal distributions of the MSLQ subscales were heavily skewed. From this section it seems evident that most of the variables in the study meet the parametric assumptions hence the reporting of the parametric analyses in this study. Discrepancies between the parametric and non-parametric results of the variables that did not meet all the parametric assumptions will also be taken into account and reported as alluded to before.

Reliability

In order to determine whether the tests that were utilized were consistently measuring what they ought to, internal consistency reliability for each of the scales used was calculated using Cronbach Alpha Coefficients. Table 2.1 and Table 2.2 present the number of items as well as the Cronbach's Alpha Coefficients for each of the variables used in the study.

Table 2.1. Cronbach's Alpha Coefficients for the MSLQ subscales (N= 69)

Scale	Number of items	Cronbach's Alpha
Value component		
Intrinsic Goal Orientation	4	0.82
Extrinsic Goal Orientation	4	0.68
Task Value	6	0.88

Expectancy Component		
Self-efficacy for learning & performance	8	0.90
Control of Learning Belief	4	0.72
Affective Component		
Test Anxiety	5	0.88
Cognitive & meta-cognitive strategies		
Rehearsal	4	0.61
Elaboration	6	0.87
Organization	4	0.87
Critical thinking	5	0.89
Regulation	12	0.77
Resource management strategies		
Time & Study Environment	8	0.40
Effort Regulation	4	0.75
Peer Learning	3	0.80
Help seeking	4	0.67

As indicated in Table 2.1, self-efficacy for learning and performance displayed a very high level of internal consistency ($\alpha = 0.90$). Intrinsic goal orientation ($\alpha = 0.82$), task value ($\alpha = 0.88$), test anxiety, ($\alpha = 0.88$), rehearsal ($\alpha = 0.87$), elaboration ($\alpha = 0.87$), organization ($\alpha = 0.89$), critical thinking ($\alpha = 0.89$) and peer learning ($\alpha = 0.80$) also displayed high levels of internal consistency reliability. Control of learning belief ($\alpha = 0.72$), regulation ($\alpha = 0.77$), and effort regulation ($\alpha = 0.75$) displayed sufficiently high levels of internal consistency reliability and extrinsic goal orientation ($\alpha = 0.68$), rehearsal ($\alpha = 0.61$) and help seeking ($\alpha = 0.67$) had reasonable internal consistency reliability. Time and study environment had a very low internal consistency reliability ($\alpha = 0.40$). From the results in Table 2.1, it can be generalized that all the MSLQ subscales except for time and study environment provided acceptable consistent measurement.

Table 2.2 Cronbach's Alpha Coefficients for the NEO Personality Inventory Scales (NEO-PI-R) (Form S) (N= 69)

Scale	Cronbach's Alpha
Neuroticism	0.88
N1: Anxiety	0.85
N2: Angry Hostility	0.87
N3: Depression	0.85
N4: Self-Consciousness	0.87
N5: Impulsiveness	0.89
N6: Vulnerability	0.86
Extraversion	0.83
E1: Warmth	0.79

E2: Gregariousness	0.78
E3: Assertiveness	0.84
E4: Activity	0.81
E5: Excitement Seeking	0.81
E6: Positive Emotions	0.80
Openness to Experience	0.76
01: Fantasy	0.69
02: Aesthetics	0.68
03: Feelings	0.68
04: Actions	0.78
05: Ideas	0.75
06: Values	0.74
Agreeableness	0.69
A1: Trust	0.66
A2: Straightforwardness	0.62
A3: Altruism	0.64
A4: Compliance	0.66
A5: Modesty	0.72
A6: Tender-Mindedness	0.60
Conscientiousness	0.91
C1: Competence	0.89
C2: Order	0.90
C3: Dutifulness	0.89
C4: Achievement	0.90
C5: Self-Discipline	0.89
C6: Deliberation	0.91

Note: Each of the five scales had 48 items; the subscales had eight items each

Table 2.2 indicates that the Cronbach's Alpha Coefficients observed for the NEO PI- R ranged between 0.69 and 0.91. The Alpha Coefficients were 0.88 for Neuroticism, 0.83 for Extraversion, 0.76 for Openness to Experience, 0.69 for Agreeableness and 0.91 for Conscientiousness. Neuroticism and Conscientiousness had strong internal consistency reliability, with subscales ranging from 0.85-0.89 and 0.89-0.91 respectively. Extraversion and Openness to Experience had high internal consistency reliability, with subscales ranging from 0.78- 0.84 and 0.68- 0.78 respectively and Agreeableness had reasonable internal consistency reliability, with subscales ranging from 0.60- 0.72. Generally, the personality traits and subscales had acceptable internal consistency.

Correlation

Before selecting which test to use to analyse the data, it was important for this study to assess the nature of the data to decide whether it met certain assumptions for parametric tests such as interval scale of measure and normality (Dancey & Reidy, 2004). It was ascertained that the variables used for this study had interval scales and that most of the variables were normally distributed. Parametric tests are more powerful than non-parametric tests, and based on the fact that only a few of the variables did not meet all parametric assumptions, it was decided that the parametric analyses (Pearson's Product-Moment Correlation Coefficients) would be utilized. However, because some of the variables were not normally distributed, non-parametric analyses (Spearman's Rank Correlation Coefficients) were also carried out for these variables and where there were substantial differences between the results, the Spearman's correlations were also reported for the variables that were non-normal.

Thus, in order to establish the relationships between the variables used in the study, namely personality as measured by the NEO PI-R, motivation and learning strategies, as measured by the MSLQ, and academic performance, as measured by students' year mark in undergraduate psychology, a correlational analysis using Pearson's Correlation Coefficients was carried out. This measured the strength, direction and the significance of the relationships between variables used in the study. Tables 3.1 to 3.6 indicate the results of the Pearson's analysis. Significant results have been highlighted in bold.

Table 3.1 Correlations between motivation and learning strategies subscales

Pearson Correlation Coefficients, N = 69						
Prob > r under H0: Rho=0						
	Intrinsic	Extrinsic	Task	Self- Efficacy	Control Of Learning	Test Anxiety
Rehearsal	0.037 0.757	0.376* 0.001	0.172 0.155	0.119 0.326	0.243* 0.044	0.237* 0.049
Elaboration	0.558* <.0001	0.376* 0.001	0.608* <.0001	0.671* <.0001	0.369* 0.002	-0.073 0.553
Organisation	0.262* 0.029	0.376* 0.001	0.293* 0.014	0.324* 0.006	0.102 0.401	0.097 0.426
Critical Thinking	0.456* <.0001	-0.0003 0.998	0.435* 0.0002	0.570* <.0001	0.198 0.102	-0.261* 0.030
Regulation	0.518* <.0001	0.269* 0.025	0.562* <.0001	0.608* <.0001	0.369* 0.002	-0.188 0.121

Time & Study Environment	0.408* 0.0005	0.211 0.081	0.355* 0.0027	0.591* <.0001	0.277* 0.021	-0.080 0.510
Effort Regulation	0.463* <.0001	0.072 0.556	0.305* 0.011	0.485* <.0001	0.067 0.581	-0.378* 0.001
Peer Learning	0.229 0.0575	0.047 0.700	0.264* 0.028	0.258* 0.032	-0.001 0.992	-0.182 0.134
Help Seeking	0.060 0.618	0.135 0.266	0.034 0.776	0.151 0.216	0.033 0.783	0.050 0.681

*Significance at $p < 0.05$

Table 3.1 presents the relationships between motivation, namely intrinsic goal orientation, extrinsic goal orientation, task value, self-efficacy, control of learning belief and test anxiety and learning strategies, namely rehearsal, elaboration, organization, critical thinking, regulation, time and study environment, effort regulation, peer learning and help seeking. Table 3.1 indicates that intrinsic goal orientation had strong significant positive relationships with most of the learning strategies, namely; elaboration ($r = 0.558$; $p < 0.0001$); critical thinking ($r = 0.456$; $p < 0.0001$); regulation ($r = 0.518$; $p < 0.0001$) and effort regulation ($r = 0.463$; $p < 0.0001$), a moderate positive relationship with time and study environment ($r = 0.408$; $p < 0.0005$) and a weak relationship with organization ($r = 0.262$; $p < 0.029$).

Extrinsic goal orientation, as illustrated in Table 3.1, had a weak positive significant relationship with the cognitive and meta-cognitive learning strategy regulation ($r = 0.269$; $p < 0.025$), moderate relationships with organization ($r = 0.376$; $p < 0.001$), rehearsal ($r = 0.376$; $p = 0.001$), and elaboration ($r = 0.376$; $p = 0.001$) and non-significant relationships with critical thinking ($r = -0.0003$; NS) and all the resource management strategies (time and study environment, effort regulation, peer learning and help seeking). Test anxiety, as illustrated in Table 3.1 had significant relationships with only three of the learning strategies. Rehearsal ($r = 0.237$; $p < 0.049$) and critical thinking ($r = -0.261$; $p < 0.030$) had weak relationships with test anxiety (rehearsal was positively related and critical thinking was negatively related), while effort regulation ($r = -0.378$; $p < 0.001$) had a moderate negative relationship.

Task value, as illustrated in Table 3.1 was found to have strong positive significant relationships with elaboration ($r = 0.608$; $p < 0.0001$) and regulation ($r = 0.562$; $p < 0.0001$), moderate relationships with critical thinking ($r = 0.435$; $p < 0.0002$) and time and study environment ($r = 0.355$; $p < 0.0027$) and weak significant relationships with organization ($r = 0.293$; $p < 0.014$),

effort regulation ($r = 0.305$; $p < 0.011$) and peer learning ($r = 0.264$; $p < 0.028$). Self-efficacy for learning and performance had strong significant relationships with almost all the learning strategies, namely elaboration ($r = 0.671$; $p < 0.0001$); critical thinking ($r = 0.570$; $p < 0.0001$); regulation ($r = 0.608$; $p < 0.0001$); time and study environment ($r = 0.591$; $p < 0.0001$) and effort regulation ($r = 0.485$; $p < 0.0001$) but weak relationships with organization ($r = 0.324$; $p < 0.006$) and peer learning ($r = 0.258$; $p < 0.032$).

Table 3.1 also indicates that control of learning had weak positive significant relationships with rehearsal ($r = 0.243$; $p < 0.044$) and time and study environment ($r = 0.277$; $p < 0.021$) and moderate relationships with elaboration ($r = 0.369$; $p < 0.002$) and regulation ($r = 0.369$; $p < 0.002$). However, a substantial difference between the Spearman's and Pearson's correlation results was found for rehearsal and control of learning. Whilst results of the Pearson's correlation illustrated significant results, those of the Spearman's correlation illustrated non-significant results ($r_s = 0.162$; NS). While the Pearson's results showed no significant relationship between control of learning and critical thinking ($r = 0.1988$; NS), the Spearman's results showed a significant relationship ($r_s = 0.247$; $p = 0.041$).

Other than those mentioned above, none of the Spearman's correlation results differed substantially from the Pearson's correlation results for any of the variables that were not distributed normally (Please refer to Appendix G).

Table 3.2 Correlations between motivation and personality subscales

Pearson Correlation Coefficients, N = 69					
Prob > r under H0: Rho=0					
	Neuroticism	Extraversion	Openness To Experience	Agreeableness	Conscientiousness
Intrinsic	-0.449 0.0001	0.153 0.208	0.021 0.863	0.026 0.832	0.565 <.0001
Extrinsic	0.100 0.411	0.169 0.164	-0.111 0.361	0.058 0.633	0.059 0.626
Task	-0.184 0.129	0.165 0.174	0.257 0.032	0.213 0.078	0.321 0.007
Self- Efficacy	-0.401 0.0006	0.319 0.007	0.201 0.0971	0.104 0.394	0.493 <.0001
Control Of Learning	-0.164 0.176	0.068 0.576	0.113 0.352	-0.014 0.906	0.187 0.122
Test Anxiety	0.485	-0.101	-0.196	0.053	-0.243

<0.0001	0.408	0.105	0.660	0.044
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*Significance at $p < 0.05$

Table 3.2 presents the relationships between personality and motivation. The results indicate that neuroticism had moderate negative significant relationships with intrinsic motivation ($r = -0.449$; $p = 0.0001$) and self-efficacy ($r = -0.401$; $p = 0.0006$) but a strong positive significant relationship with test anxiety ($r = 0.485$; $p < 0.0001$). A substantial difference was found between the Spearman's and Pearson's correlation results for neuroticism and the task value component; whereas the Pearson's results indicated a non-significant relationship, the Spearman's results indicated a significant negative relationship ($r_s = -0.244$; $p = 0.043$).

Table 3.2 also indicates that extraversion had a moderate positive significant relationship with only one of the motivation subscales, self-efficacy ($r = 0.319$; $p = 0.007$). Similarly, openness to experience had a significant positive but weak relationship with only one of the motivation subscales, task value ($r = 0.257$; $p = 0.032$), however the Spearman's results differed from the Pearson's results, indicating that this relationship was not significant ($r_s = 0.211$; NS). The Spearman's correlations also indicated that there was a significant relationship between openness to experience and test anxiety ($r_s = -0.251$; $p = 0.038$) whilst the Pearson's correlation illustrated a non-significant relationship between these variables.

Table 3.2 above also indicates that agreeableness had no significant relationships with any of the motivation scales, while conscientiousness had strong positive significant relationships with intrinsic motivation ($r = 0.565$; $p < 0.0001$) and self-efficacy ($r = 0.493$; $p < 0.0001$) but a weak positive significant relationship with task value ($r = 0.321$; $p = 0.007$) and a weak negative significant relationship with test anxiety ($r = -0.243$; $p = 0.044$).

Other than those mentioned above, none of the Spearman's correlation results differed substantially from the Pearson's correlation results for any of the personality and motivation variables that were not distributed normally (Please refer to Appendix G).

Table 3.3 Correlations between personality and learning strategies subscales

Pearson Correlation Coefficients, N = 69					
Prob > r under H0: Rho=0					
	Neuroticism	Extraversion	Openness To Experience	Agreeableness	Conscientiousness
Rehearsal	0.173 0.154	0.070 0.562	-0.181 0.136	0.220 0.068	0.069 0.572
Elaboration	-0.339 0.004	0.309 0.009	0.131 0.281	0.247 0.040	0.504 <0.0001
Organisation	-0.007 0.952	0.160 0.188	-0.021 0.861	0.142 0.243	0.211 0.082
Critical Thinking	-0.416 0.0004	0.269 0.025	0.219 0.070	0.074 0.540	0.497 <0.0001
Regulation	-0.361 0.002	0.292 0.0147	0.015 0.899	0.146 0.229	0.556 <0.0001
Time & Study Environment	-0.253 0.035	0.307 0.010	-0.007 0.954	0.228 0.059	0.648 <0.0001
Effort Regulation	-0.383 0.001	0.150 0.215	0.094 0.442	0.222 0.065	0.657 <0.0001
Peer Learning	-0.277 0.0210	0.291 0.015	-0.126 0.300	0.108 0.374	0.173 0.153
Help Seeking	-0.032 0.793	0.308 0.010	-0.079 0.515	0.359 0.002	0.121 0.682

*Significance at p<0.05

Table 3.3 presents the relationships between personality and learning strategies. The results indicate weak negative significant relationships between neuroticism and elaboration ($r = -0.339$; $p = 0.004$); time and study environment ($r = -0.253$; $p = 0.035$) and peer learning ($r = -0.277$; $p = 0.021$) but moderate relationships with effort regulation ($r = -0.383$; $p = 0.001$); critical thinking ($r = -0.416$; $p = 0.0004$) and regulation ($r = -0.361$; $p = 0.002$). Non-significant relationships were found between this variable and rehearsal, organization and help seeking. Table 3.3 also indicates that extraversion had weak positive significant relationships with elaboration ($r = 0.309$; $p = 0.009$); critical thinking ($r = 0.269$; $p = 0.025$); regulation ($r = 0.292$; $p = 0.015$); time and study environment ($r = 0.307$; $p = 0.010$); peer learning ($r = 0.291$; $p = 0.015$) and help seeking ($r = 0.308$; $p = 0.010$) and non-significant relationships with rehearsal, organization and effort regulation.

Openness to experience, as indicated in Table 3.3 above, was shown to have non-significant relationships with all the learning strategies (resource management and cognitive and meta-

cognitive strategies), while agreeableness was shown to have a moderate significant relationship with help seeking ($r = 0.359$; $p = 0.002$) and a weak significant relationship with elaboration ($r = 0.247$; $p = 0.040$). The Spearman's correlations for agreeableness and effort regulation ($r_s = 0.237$; $p = 0.049$) and agreeableness and time and study environment ($r_s = 0.294$; $p = 0.0143$) were also found to be significant whereas the Pearson's correlations were non-significant, as illustrated in Table 3.3 above.

In Table 3.3, conscientiousness was shown to have strong positive significant relationships with some of the cognitive and meta-cognitive strategies such as elaboration ($r = 0.504$; $p < 0.0001$); critical thinking ($r = 0.497$; $p < 0.0001$); regulation ($r = 0.556$; $p < 0.0001$); effort regulation ($r = 0.657$; $p < 0.0001$) and time and study environment ($r = 0.648$; $p < 0.0001$). Conscientiousness had non-significant relationships with rehearsal, organization, peer learning and help seeking.

As alluded to before, none of the Spearman's correlation results differed substantially from the Pearson's correlation results reported for any of the personality and learning variables that were not distributed normally (Please refer to Appendix G).

Table 3.4 Correlation between motivation and academic performance

	Intrinsic	Extrinsic	Task	Self-Efficacy	Control Of Learning	Test Anxiety
Performance	0.215 0.291	-0.040 0.845	0.201 0.325	0.321 0.110	0.048 0.817	-0.278 0.169

*Significance at $p < 0.05$

Table 3.4 presents the relationships between motivation and academic performance, and indicates that none of the motivation subscales had significant relationships with academic performance. It was interesting to note that even though these results were not significant, academic performance had negative relationships with test anxiety and extrinsic motivation.

Table 3.5 Correlation between learning strategies and academic performance

	Rehearsal	Elaboration	Organisation	Critical Thinking	Regulation	Time & Study Environment	Effort Regulation	Peer Learning	Help seeking
Performance	-0.322 0.109	-0.286 0.156	-0.280 0.166	0.363 0.068	-0.142 0.489	0.239 0.239	0.265 0.192	-0.149 0.464	0.223 0.273

*Significance at $p < 0.05$

Table 3.5 presents the relationships between learning strategies and academic performance and indicates that none of the learning strategy subscales had significant relationships with academic performance. Whilst none of the Pearson's correlations were significant as illustrated in Table 3.5 above, the Spearman's correlations between academic performance and rehearsal ($r_s = -0.396$; $p = 0.045$) and critical thinking ($r_s = 0.484$; $p = 0.012$) were significant.

Table 3.6 Correlation between personality and academic performance

	Neuroticism	Extraversion	Openness To Experience	Agreeableness	Conscientiousness
Performance	-0.298 0.138	0.411 0.036	0.451 0.021	0.296 0.142	0.247 0.231

*Significance at $p < 0.05$

Table 3.6 presents the relationships between personality and academic performance and indicates that of all the personality subscales, only extraversion ($r = 0.411$; $p = 0.036$) and openness to experience ($r = 0.451$; $p = 0.021$) had positive significant relationships with academic performance. An interesting non-significant negative relationship was found between neuroticism and academic performance.

Multiple Regression

Having established the relationships between the variables used in the study, it was also of importance for this study to establish the extent to which the independent variables had an effect on the dependent variable (academic performance), and the extent to which a change in the independent variables could impact on the dependent variable (Dancey & Reidy, 2004). This was done by utilizing a forward stepwise multiple regression model as well as a full fitted multiple regression model. The tables below present the findings of the multiple regression procedures conducted specifically to analyse the proportion of variance that significant predictors contribute to the explanation of academic performance and the extent to which the independent variables could predict academic performance.

Table 4.1 below provides the results of a forward selection procedure which was carried out to determine the effects of motivation on academic performance using subscales from the MSLQ. It was found that the association between academic performance and motivation was weak with about 19% of the variation in academic performance explained by motivation. The regression model was not significant ($F_{2, 23} = 2.70$; $p = 0.088$), implying that the results were likely to be

based on sampling error hence the model was not good for predicting this relationship. Table 4.1 indicates weak correlations between academic performance and the motivation subscales, with only self-efficacy for learning indicated as a significant predictor of academic performance ($t = 3.17$; $p = 0.0302$).

Table 4.1 Predictive relationships between motivation and academic performance

Variable	Parameter Estimate	Standard Error	Partial R ²	Model R ²	t Value	Pr > t
Intercept	95.76402	30.23746			3.17	0.0043
Self-Efficacy for Learning	2.24026	0.96955	0.1027	0.1027	2.31	0.0302
Control of Learning	-2.85971	1.81391	0.0875	0.1902	-1.58	0.1286

*Significance at $p < 0.05$

To determine the effects of learning strategies on academic performance, a second forward selection procedure was carried out. As illustrated in Table 4.2., the association between academic performance and the learning strategies was very weak with about 32% of the variation in academic performance explained by learning strategies. The regression model was not significant ($F_{2, 23} = 2.45$; $p = 0.077$) implying that the results were likely to be based on sampling error hence the model was not good for predicting this relationship. Table 4.2 also indicates that none of the learning strategies were significant predictors of academic performance.

Table 4.2 Predictive relationship between learning strategies and academic performance

Variable	Parameter Estimate	Standard Error	Partial R ²	Model R ²	t value	Pr > t
Intercept	118.81604	30.43396			3.90	0.0008
Rehearsal	-1.45286	1.38820	0.1317	0.1317	-1.05	0.3072
Elaboration	1.37174	1.12070	0.1197	0.2514	1.22	0.2345
Organisation	-1.62244	1.17184	0.0314	0.2828	-1.38	0.1807
Critical Thinking	0.78217	0.89852	0.0356	0.3183	0.87	0.3939

*Significance at $p < 0.05$

Table 4.3 illustrates the results of a forward selection procedure to determine the effects of personality on academic performance using the NEO PI-R subscales. As illustrated in Table 4.3, the association between academic performance and personality was weak, with about 29% of the variation in academic performance explained by personality. The regression model was significant ($F_{2, 23} = 6.11$; $p = 0.021$) implying that the results were unlikely to be based on sampling error hence the model was sufficient in predicting the relationships. Table 4.3 indicates that of all the personality traits, only openness to experience was significant ($t = 2.70$; $p = 0.0129$).

Table 4.3 Predictive relationship between personality and academic performance

Variable	Parameter Estimate	Standard Error	Partial R ²	Model R ²	t value	Pr > t
Intercept	10.26123	37.65171			0.27	0.7876
Openness to experience	0.62934	0.23347	0.2030	0.2030	2.70	0.0129
Conscientiousness	0.30033	0.18299	0.0836	0.2866	1.64	0.1143

*Significance at p<0.05

Table 4.4 below represents the full fitted regression model and illustrates that none of the variables in the study were found to have predictive relationships with academic performance at p=0.05.

Table 4.4 Full fitted Regression model

Regression of p-values for Academic Performance All Variables Entered: R-Squared= 0.799			
Variable	Parameter	F Value	Pr> F
Intrinsic Goal Orientation	0.201	0.09	0.9339
Extrinsic Goal Orientation	1.108	0.96	0.3817
Task Value	2.371	1.17	0.2945
Self-efficacy for learning & performance	-0.765	-0.38	0.7198
Control of Learning Belief	-3.072	-1.12	0.3140
Test Anxiety	0.512	0.70	0.5177
Rehearsal	-0.869	-0.65	0.5439
Elaboration	-0.034	-0.02	0.9863
Organization	-1.422	-1.70	0.1491
Critical thinking	0.442	0.25	0.8099
Regulation	0.529	0.87	0.4238
Time & Study Environment	0.089	0.05	0.9602
Effort Regulation	-0.9043	-0.45	0.6699
Peer Learning	-1.919	-0.92	0.4002
Help seeking	1.563	1.00	0.3629
Neuroticism	-0.122	-0.30	0.7786
Extraversion	0.237	0.46	0.6619
Openness to Experience	0.157	0.35	0.7406
Agreeableness	-0.088	-0.25	0.8159
Conscientiousness	0.269	0.44	0.6773

*Significance at p<0.05

The results of the regression analysis illustrate that only openness to experience and self-efficacy had predictive relationships with academic performance. These results and others that have been reported in this section will be discussed in the following section.

CHAPTER 5

Discussion of Results

This research aimed primarily at exploring individual student factors that contribute to or impact on academic performance. Having acknowledged the diverse studies that have been conducted on factors that impact on academic success, and realising the gap within the South African context in researching factors such as personality, motivation and learning strategies' impact on academic success, this study was conducted to bridge the gap in research and also to assert the extent to which these variables are important and contribute towards teaching and learning. This knowledge can be used to not only gain a greater understanding of which variables determine success, but also to provide important information for interventions that could help improve students' performance. In order to achieve this, certain statistical tests were conducted utilizing the instruments adopted for this study, namely the NEO PI-R and the MSLQ, as well as certain demographic variables, which were used to describe the sample.

The description of the sample is an important aspect to discuss since it provides a background understanding of how the nature of the sample impacts on the type of statistical test that can be utilized as well as the extent to which results of the study may be interpreted and inferred (Howell, 1999). The sample in this study, as presented in Chapter Three, was small ($n = 69$) and not representative of the population of psychology undergraduate students at the University of the Witwatersrand; and the response for the dependent variable (academic performance) was very low ($n = 26$), meaning that the results may have been affected. Even though confidentiality and anonymity were guaranteed for students, most students still did not provide their student numbers to allow the researcher to access students' marks.

Porter (2004) argues that the inclusion of confidentiality may heighten participants' awareness of what might happen to their responses and thus proposes that one should pay attention on how an information sheet is phrased, especially in cases where the research does not have sensitive aspects. Taking this into consideration, students who completed the questionnaire might not have felt comfortable in providing their student numbers in fear of being identified although the information sheet emphasized the idea that the researcher would not be able to identify them and

would not be able to link their marks with their student numbers, ensuring anonymity. The level at which this was emphasized could have resulted in an awareness that could have created skepticism thus lowering the response rate.

Factors such as the overall length of the questionnaire, the sampling technique and the sensitivity of probable identification regarding academic results could have lessened the response rate of students, hence the lack of representativeness in the sample (Porter, 2004). The questionnaires required about an hour and fifteen minutes of students' time, and contained two hundred and forty items from the NEO PI-R and eighty from the MSLQ, which probably contributed to the low response rate of students. Previous studies have found the response rate of students to be around 21% (Dey, 1997). Porter and Whitcomb (2004) have also found that college students tend to be incentives-driven yet also caution that incentives may have potential negative impacts on future studies by developing unrealistic expectations.

It is of importance to note that the sample was not representative of University of the Witwatersrand undergraduate psychology students or psychology students in general. The gender representation as well as the year level representation was disproportional, with more females than males and more first years than second or third year level students. Most of the participants that completed the questionnaire were Africans (non-whites) and the majority of participants were not first-language English speakers.

Having noted the sample distribution as well as the effects of the response rate on the study, it was also important for this study to ensure that the instruments used were proper. In an attempt to test the reliability of the instruments, to ensure that the instruments consistently measured similar concepts, internal consistency reliability for each of the scales used was calculated using the Cronbach Alpha Coefficients. The results found Cronbach's Alpha Coefficients between 0.72 to 0.90 for eleven of the fifteen subscales of the MSLQ and between 0.61 to 0.67 for three of the remaining four of the MSLQ subscales, with only one subscale (time and study environment: $\alpha = 0.40$) not reliable. These results were consistent with previous studies that argued that the MSLQ is a reliable test (Artino, 2007; Costa & McCrae, 1994; De Raad, 1992; Larsen & Buss, 2008; Taylor, 2004). Artino (2007) observed internal consistency estimates ranging from 0.52 to 0.83,

whereas this study observed internal consistency estimates ranging from 0.40 to 0.90. Similarly to Artino (2007), this study found self-efficacy (0.90) to have the highest Alpha coefficient.

Internal consistency reliability for the NEO PI-R individual scales ranged from 0.60 to 0.91 and the Cronbach's Alpha Coefficients for the five traits ranged from 0.69 to 0.91. These results were consistent with Costa and McCrae's (1992a) result who found that all five NEO PI-R traits had good internal consistency reliability. This study was thus able to utilize fairly reliable instruments.

Based on the results of this study, as well as results from other studies, the MSLQ may be argued to be a generally reliable instrument for measuring learning strategies and motivation although it is important to take note of the poor reliability of the time and study environment subscale. This may have had an impact on the results and how they were interpreted. The NEO PI-R was also found to be a reliable instrument for measuring personality, with fairly high internal consistency estimates.

In order to answer the main research questions about the relationships between the variables examined in this study (personality, motivation, learning styles and academic performance in psychology) and the degree to which the independent variables predicted academic performance in psychology in a sample of University of the Witwatersrand psychology undergraduate students, a correlational analysis and regression analysis were conducted. The results that have been reported in the previous section will be discussed in this section.

The results of the correlational analysis indicated an inverse relationship between neuroticism and motivational strategies such as intrinsic goal orientation ($r = -0.449$; $p = 0.0001$), self-efficacy ($r = -0.401$; $p = 0.0006$), and, using the Spearman's correlation results, task value ($r_s = 0.244$; $p = 0.043$). These results were supported by other studies (Butler, 1987; Harackiewicz et al., 1998; Pintrich, 1999; Stipek & Kowalski, 1989). These results may illustrate that the more one lacks confidence and is able to be distracted, the less one would tend to be optimistic or experience value and worth in oneself or even the task at hand.

The results of the current study also illustrated that some of the cognitive and meta-cognitive strategies such as effort regulation ($r = -0.383$; $p = 0.001$), regulation ($r = -0.361$; $p = 0.002$) and critical thinking ($r = -0.416$; $p = 0.0004$) had an inverse relationship with neuroticism, as was proposed by previous studies (Chamorro-Premuzic & Furnham, 2003a; McKenzie, 1989). These results illustrate the negative impact neurotic, distractible or unstable characteristics may have on focusing and regulating learning. They also illustrate the impact these behavioural tendencies could have on meaningful and critical engagement with tasks. The distractible character seems to be associated with the inability to focus thinking and learning.

Rehearsal, while previously deemed a surface processing approach to learning that tends to impact negatively on academic performance, especially for university students, has been found by the current study to have a non-significant but positive relationship with neuroticism and a significant negative relationship with academic performance. This variable would also have been expected to have a negative significant relationship or a non-significant relationship with critical thinking, conscientiousness and openness to experience as it has been argued that it does not promote understanding and insight (Pintrich, 1999; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Weinstein & Mayer, 1986). It was however found to have a non-significant negative relationship with openness to experience but a positive non-significant relationship with conscientiousness. Interestingly, even though rehearsal had a non-significant negative relationship with academic performance with the Pearson's correlation, this relationship was significant with the Spearman's correlation. Rehearsal may therefore play a significant role in undergraduate psychology as taught at the University of the Witwatersrand. This may thus mean that cramming or regurgitation of information may not enhance performance; students would thus be expected to critically engage with the task and apply themselves on tasks assigned to achieve academically. McIntyre and Munson (2008) have found that cramming tends to have a negative effect on academic performance since it does not improve the retention of information.

Elaboration, like rehearsal, whilst previously deemed to have significant positive or non-significant relationships with neuroticism (Blicke, 1996), has been found by this study to have a weak negative significant relationship. Blicke (1996) argued that the tendency to elaborate creates confusion. It was interesting for this study to find this relationship, which could

subsequently mean that the more distractible one is, the less the tendency is to elaborate because of an impatient characteristic associated with distractibility. The results could also be interpreted to mean that a higher level of confidence may be associated with the tendency to elaborate whilst low confidence levels and anxiety could be associated with lower levels of elaboration because of a lack of trust or self-worth. Elaboration has been defined as the ability to organize and connect ideas (Pintrich & Garcia, 1991; Schiefele, 1994). In order to connect ideas, a certain level of concentration and knowledge is needed, which may be affected by neurotic tendencies. A high level of neuroticism may be an indication of low concentration levels and anxiety thus affecting one's ability to organize and connect ideas.

In line with previous research studies, this study found a significant positive relationship between test anxiety and neuroticism ($r = 0.485$; $p < 0.0001$) (Ames & Archer, 1988; Busato, et al., 2000; Butler, 1987; Chamorro-Premuzic & Furnham, 2003a; Dweck & Leggett, 1988; Harackiewicz, et al., 1998; Meece & Holt, 1993; Pintrich & Garcia, 1991; Pintrich & Schrauben, 1992; Pintrich et al., 1994; Stipek & Kowalski, 1989; Wolfe & Johnson, 1995) and a negative non-significant relationship between neuroticism and academic performance. These results could mean that the tendency to have a neurotic or an anxious character could impact on one's stability or calmness in testing situations, increasing fear and apprehension thus impacting on academic performance. The negative relationships between academic performance and neuroticism and test anxiety have been associated with high levels of stress and anxiety under test or examination conditions, as well as impulsive behaviour that tends to be associated with this trait. Such behaviours and reactions have been argued to affect learning and discipline (Chamorro-Premuzic & Furnham, 2003a, 2003b; McKenzie, 1989). Test anxiety has been identified as one of the problems frequently experienced by students from the University of the Witwatersrand. Anxiety for some students has been identified to be so intense such that it negatively affects students' performance (University of the Witwatersrand, 2009).

All the variables that have been discussed as having been expected to have either negative or non-significant relationships with academic performance were found to have these relationships with academic performance. These variables are rehearsal ($r_s = -0.396$; $p = 0.045$), elaboration ($r = -0.286$; $p = \text{NS}$), extrinsic motivation ($r = -0.040$; $p = \text{NS}$), neuroticism ($r = -0.298$; $p = \text{NS}$) and test anxiety ($r = -0.278$; $p = \text{NS}$). These variables were not only negatively related to academic

performance but were also positively related to each other. This illustrates the similarities they may share and how they could then impact negatively on academic performance. Even though some of the results were non-significant, the strength and/or direction of some of the relationships were as expected and it is possible that significance was not achieved because of an insufficient sample size. These variables were also found by the current study to have negative relationships with critical thinking, self-efficacy, intrinsic goal orientation, regulation and effort regulation as was hypothesized (Chamorro-Premuzic & Furnham, 2003a; McKenzie, 1989; Pervin, 1993). Critical thinking, self-efficacy, intrinsic goal orientation, regulation and effort regulation have been proposed to play a significant role in improving academic performance (Skaalvik, 1997, as cited in Pintrich & Schunk, 2002; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991). Critical thinking ($r_s = 0.484$; $p = 0.0123$) was the only variable in the current study found to have significant relationships with academic performance. This thus suggest that a high sense of confidence, worth, and critical and meaningful engagement with tasks would tend to yield good results (Bandura, 1997; Pintrich & Garcia, 1991).

Further, Skaalvik (1997, as cited in Pintrich & Schunk, 2002) and Wolters, Yu & Pintrich (1996, as cited in Pintrich & Schunk, 2002) assert that a student adopting an external goal orientation and performing well would tend to have increased intrinsic motivation. This further suggests that there is a possibility that one may not be able to distinguish the extent to which performance goal or mastery may be associated to academic performance when they interact in influencing performance; both may be important factors in improving academic performance.

It is imperative to take note of Kaplan and Midgley's (1997, as cited in Pintrich & Schunk, 2002) study which found no relationship between extrinsic goal orientation and adaptive learning strategies but a positive relationship with maladaptive learning strategies. This meant that students that tend to adopt maladaptive learning strategies may be challenged when expected to provide insight and understanding of tasks and therefore are highly likely not to succeed because of a lack of understanding. This study seems to support Kaplan and Midgley's (1997, as cited in Pintrich & Schunk, 2002) assertion that extrinsic goal orientation is not an adaptive learning strategy and cannot be sustained. This may thus mean that extrinsic goal orientation may impact negatively on academic performance because of the level of involvement or investment on the

task. This could be related to the fact that maladaptive learning strategies tend not to focus on the long-term effects and are not sustainable or enriching for learning and performance.

Pintrich and Schunk (2002) and Weinert and Kluwe (1986) argue inversely that students with extrinsic goal orientation as well as self-efficacy in their abilities could develop an adaptive pattern thus seeking challenging tasks. Self-efficacy thus seems to be an important factor inferred to play a role in determining academic performance (Bandura, 1997). Whilst self-efficacy would have been expected to have a significant positive relationship with academic performance (John, 2004, Pintrich & De Groot, 1990; Pintrich & Garcia, 1991); meaning that the more confident and efficient students were about their competency, the more they would succeed in their studies; the current study found a non-significant relationship. These results could have been affected by the sample size since the stepwise regression analysis indicated a predictive positive relationship.

Even though this study was not investigating the relationship between the motivational subscales, it was interesting to find that there was a strong significant relationship between self-efficacy, task involvement and intrinsic goal orientation. This finding was consistent with other finding since a high sense of confidence and worth would generally not have positive relationships with anxious behaviours (Kaplan & Midgley, 1997, as cited in Pintrich & Schunk, 2002; Skaalvik, 1997, as cited in Pintrich & Schunk, 2002; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991).

An increase in self-efficacy was also found to be related to an increase in the use of the resource management strategies such as time and study environment ($r = 0.591$; $p < 0.0001$) and effort regulation ($r = 0.305$; $p = 0.011$) as well as cognitive and meta-cognitive strategies, except for rehearsal, which was expected. This was consistent with Pintrich and Garcia's (1991) and Schiefele's (1994) studies. It was interesting to find a non-significant relationship between self-efficacy and help seeking. This could mean that an individual with a greater sense of confidence, competence and worth may tend not to seek help because of their assertive stance.

It was puzzling though that organization and regulation had negative relationships with academic performance, even though these relationships were non-significant. Previous studies have

proposed positive significant relationships (Pintrich, 1999; Weinert & Kluwe, 1987). Organization has been defined as a strategy that focuses on selecting main ideas from text and regulation as a strategy focusing on the monitoring and control of tasks and behaviour ((Pintrich, 1999; Weinert & Kluwe, 1987). This could mean that identifying main ideas and the control of tasks and behaviour may not have much relevance in promoting performance. What could be more important could be the ability to critically engage with the task and the ability to utilize the main aspects identified to improve the quality of one's work. In courses such as psychology, it may be more important to be able to utilize information and think of the ways in which it factors or could be applied in every day life. The ability to identify and organize one's information in and of itself may not be sufficient.

In line with Pintrich's (1999) study, this study found significant strong relationships between intrinsic goal orientation and cognitive and meta-cognitive strategies, such as elaboration ($r = 0.558$; $p < 0.0001$), critical thinking ($r = 0.456$; $p < 0.0001$), regulation ($r = 0.518$; $p < 0.0001$), effort regulation ($r = 0.463$; $p < 0.0001$) and time and study environment ($r = 0.408$; $p = 0.0005$) and a weak positive relationship with organization ($r = 0.262$; $p = 0.029$). Task value belief also had positive relationships with elaboration ($r = 0.608$; $p < 0.0001$), critical thinking ($r = 0.435$; $p < 0.0001$), regulation ($r = 0.562$; $p < 0.0001$), time and study environment ($r = 0.355$; $p = 0.0027$), effort regulation ($r = 0.305$; $p = 0.011$) and organization ($r = 0.293$; $p = 0.0144$).

It has been argued that the more students are intrinsically goal orientated, the more they tend to report monitoring their cognition and striving to understand hence becoming aware of their learning and alternatively using various cognitive strategies, which then enhances academic performance (Butler, 1987; Harackiewicz, et al., 1998; Stipek & Kowalski, 1989). This seems to be supported by the findings of this study and it was also interesting to find that both task value and intrinsic goal orientation were not significantly related to rehearsal, whilst extrinsic goal orientation was positively related to rehearsal. This thus affirms the proposition that rehearsal may not play a vital role in promoting academic performance in psychology; it may either have no relevance or have a negative impact (Pintrich, 1999; Pintrich & De Groot, 1990; Pintrich & Garcia, 1991; Weinstein & Mayer, 1986). Elaboration, on the other hand, was found by this study to have a strong significant relationship with these variables thus possibly affirming the

proposition alluded to before that elaboration could happen when one has more information and is confident about a task.

According to Pintrich and Schunk (2002), the negative consistent relationships between extrinsic goal orientation and cognitive and meta-cognitive strategies are a result of the tendency of students adopting extrinsic goal orientation to utilize less time and effort on deeper processing. Pintrich and Schunk (2002) further argue that intrinsic compared to extrinsic goal orientation tends to be associated with adaptive patterns. This study found that intrinsic goal orientation and task value belief were more significantly related to effort regulation and time and study environment than peer learning and help seeking. Effort regulation and time and study environment could therefore possibly be regarded as more adaptive patterns than help seeking and peer-learning for studying psychology.

Extraversion assesses the extent to which an individual can have interpersonal interaction with others (Costa & McCrae, 1994). This personality trait was found to have positive significant relationships with help-seeking ($r = 0.308$; $p = 0.010$), peer-learning ($r = 0.291$; $p = 0.015$), time and study environment ($r = 0.307$; $p = 0.010$), critical thinking ($r = 0.269$; $p = 0.025$) and elaboration ($r = 0.309$; $p = 0.009$). The relationships between extraversion and most of the resource management strategies, especially help seeking and peer learning, were expected relationships since these variables are interpersonally oriented. A person that finds it easy to interact with others would also be expected to easily approach others for help or find it easy to learn from others through interacting.

Extraversion was also found to have a positive significant relationship with academic performance ($r = 0.411$; $p = 0.036$) suggesting that the more sociable one is, the more one would tend to perform well. This was supported by Entwistle (1972), who posits that although stable introverts are more likely to engage in good study habits, their high anxiety drive might result in unstable study habits. Chamorro-Premuzic and Furnham (2003a) contrary to Entwistle (1972) argue that extroverts tend to be distractible, whilst introverts tend to be focused. Seemingly, as much as introversion has been previously deemed to have a positive impact on academic performance, high neurotic tendencies in introverts may affect performance and distractible

behavior in extroverts may also hinder performance (De Fruyt & Mervielde, 1996; Farsides & Woodfield, 2003). These results may therefore indicate that the ability to have interpersonal interactions and an assertive character may be important attributes within the psychology field since it is a field that requires an ability and understanding of human interaction and behaviour. A certain level of assertiveness is also required in order to achieve. This also relates to what previous studies have alluded to about self-efficacy and the importance of stability on academic performance.

The positive relationships found between extraversion and academic performance and critical thinking were interesting relationships since they could confirm Entwistle (1972)'s argument that stable extroverts, unlike introverts, may engage in good study habits thus reflecting and engaging with tasks, which may in turn improve their academic performance.

Openness to experience, consistent with other studies, was found to have a significant positive predictive relationship with academic performance ($r = 0.451$; $p = 0.021$) (De Fruyt & Mervielde, 1996; Diseth, 2003; Dollinger & Orf, 1991; Farsides & Woodfield, 2003; Hirschberg & Itkin, 1978; Shuerger & Kuma, 1987). This was contrary to other studies which asserted that predictive relationships could not be found (Busato, et al., 2000; Chamorro-Premuzic & Furnham, 2003a; Wolfe & Johnson, 1995). Chamorro-Premuzic and Furnham (2003a) argued that lower scores in openness to experience could strongly relate with high scores in academic achievement but also ascertained that high scores in openness could also be strongly related to better achievement in courses that are not defined by systematic rules, like psychology. This was found in the current study thus could suggest that psychology as presented at the University of the Witwatersrand is a course that requires critical engagement with the task rather than the application of systematic rules. Openness to experience has also been highly associated with typical intellectual engagement, divergent thinking as well as achievement through independence (Brand, 1994; Goff & Ackerman, 1992; Hofstee, 2001; McCrae, Costa & Piedmont, 1993), which could explain the significant association with academic performance.

Whilst openness to experience had a significant positive relationship with academic performance, interestingly and unexpectedly it was not related to any of the learning strategies

and to almost none of the motivation variables, other than task value ($r=0.257$; $p = 0.032$). As it has been previously alluded to, this variable is associated with intellectual engagement, which may explain the relationship with task value, since if one has interest and focuses on the long term utilization of the task, ultimately one would tend to critically engage with the task because of the value awarded to the task. Openness to experience would have also been expected to have significant relationships with critical thinking and self-efficacy since it is also associated with divergent thinking and achievement through independence (Brand, 1994; Goff & Ackerman, 1992; Hofstee, 2001; McCrae, Costa & Piedmont, 1993). This was however not found in the current study and the results could have been affected by the sample size.

It is worth noting that not only did openness to experience have a significant relationship with academic performance, but it also had a significant predictive relationship with academic performance. This could be a result of the way the psychology undergraduate course is structured. It tends to foster independent work rather than group work and achievement is therefore based on individual tasks. This could have had an impact on the positive relationships found between academic performance and openness to experience. The results therefore may indicate that students that tend to think outside the box and achieve through independence in a University of the Witwatersrand psychology course would be the ones that tend to achieve.

It is also interesting how this variable (openness to experience) was found to be not related to any of the learning strategies and to almost none of the motivational variables, except for task value ($r= 0.257$; $p= 0.032$) and, using the Spearman's correlation, test anxiety ($r_s = -0.251$; $p = 0.038$). This could imply that the importance of being calm, focused and valuing the task as well as the ability to utilize information and think divergently could be some of the important aspects that may facilitate academic achievement.

Whilst conscientiousness was expected to have a significant relationship with academic performance as proposed by previous studies (Blicke, 1996; Busato et al., 2000; De Raad & Schouwenburg, 1996; Dollinger & Orf, 1991; Goff & Ackerman, 1992; Wolfe & Johnson, 1995), especially studies that have been conducted with psychology students, this study found a non-significant relationship. Conscientiousness is a trait that weighs the degree to which an

individual is disciplined and goal-directed (Costa & McCrae, 1985; Larsen & Buss, 2008; Pervin, 1993). This trait was found to have significant positive relationships with intrinsic goal orientation ($r=0.565$; $p < 0.0001$) and task value ($r=0.321$; $p = 0.007$), self-efficacy ($r=0.493$; $p < 0.0001$), elaboration ($r=0.504$; $p < 0.0001$), regulation ($r=0.556$; $p < 0.0001$), critical thinking ($r=0.497$; $p < 0.0001$), effort regulation ($r=0.657$; $p < 0.0001$) and time and study environment (0.648 ; <0.0001). Most of these variables are also associated with discipline and meaningful goal directedness, thus the relationship with conscientiousness.

Conscientiousness had a negative significant relationship with test anxiety ($r = -0.243$; $p = 0.044$), meaning that the more goal-directed and disciplined one is, the less one would tend to be anxious during exams or assessments. It was puzzling though to find that this variable was not significantly related to academic performance. This may indicate though that an individual may be goal-directed based on personal interest separate from academic interest since the personality traits are generic traits not specific to academic related activities. This could also be a result of the sample size.

The current study found the relationship between agreeableness and academic performance to be non-significant. This finding is concurrent with other studies (De Fruyt & Mervielde, 1996; Farsides & Woodfield, 2003; Hirschberg & Itkin, 1978; Shuerger & Kuma, 1987). This trait assesses the quality of an individual's interpersonal orientation and complacency (Costa & McCrae, 1994). Agreeableness was found by this study to only have significant positive relationships with elaboration and help seeking. A significant positive relationship between this trait and peer-learning would have been expected since help seeking and peer-learning are variables that tend to focus on interpersonal orientation and compliance. This could mean that interpersonally-oriented characteristics or strategies do not play a significant role in promoting academic achievement. These strategies and trait could facilitate how one accesses information. The results could also illustrate that agreeableness without critical engagement with tasks may not play a significant role in learning and achievement (Farsides & Woodfield, 2003).

As reported in the results, using a stepwise regression model only two variables had significant predictive relationships with academic performance: self-efficacy ($t = 2.31$; $p=0.0302$) and

openness to experience ($t = 2.70$; $p=0.0129$) and none of the variables were significant using a full fitted regression model. Previous studies have found conscientiousness and openness to experience to have predictive relationships with objective test performance in psychology students (Blicke, 1996; Busato et al., 2000; De Raad & Schouwenburg, 1996; Diseth, 2003; Dollinger, & Orf, 1991; Goff & Ackerman, 1992; Wolfe & Johnson, 1995). This result could be affected by the sample size and could be verified by utilizing other methods of analysis or increasing the sample size. As previously discussed, self-efficacy and openness to experience have been asserted to have predictive relationships with academic performance (Bandura, 1997; Chamorro-Premuzic & Furnham, 2003b; John, 2004; Skaalvik, 1997, as cited in Pintrich & Schunk, 2002), although the relationship between academic performance and openness to experience has been debated (Chamorro-Premuzic & Furnham, 2003a, 2003b) as previously alluded to.

CHAPTER 6

Limitations

In the previous chapters, results of the current study were reported and discussed. This final chapter aims to provide limitations that may have impacted on the study and also provide recommendations for future studies.

Blicke (1996) and Pintrich (1999) argue that the nature of self-report makes it subject to bias and distortion. Self-reports may also not be reliable measures because some aspects of the variance could stem from the method used to develop the questionnaire. This effect could have had an influence on the study especially if students did not provide truthful information about themselves. Another limitation could also be related to what Diseth (2003) refers to as immaturity in learners to actually identify some of their attributes, which was important for this study.

The sample in this study, as presented in the previous chapters, was relatively small ($n = 69$) and not representative of the population of psychology undergraduate students at the University of the Witwatersrand or psychology students in general. The response to the dependent variable (academic performance) was very low ($n = 26$). The low response rate might have been influenced by the overall length of the questionnaire, the sensitivity in providing information that could assist in accessing students' marks and the timing of data collection. Students were asked to complete the questionnaire in a period where they were submitting assignments and preparing for examinations. The size of the sample may have had implications for the results and how they could be interpreted (Dietz & Kalof, 2009). Dietz and Kalof (2009) argue that it is bad practice to use a small sample since one cannot make inferences based on small samples. This thus means that the results of this study remain tentative and need to be interpreted with caution.

It was noted that most of the results from the regression analysis, even the ones previously deemed predictive were not found significant in the current study. This could have been affected by the sample size. A small sample size according to Dietz and Kalof (2009) tends to raise the problem of multi-collinearity. Multi-collinearity occurs when the independent variables are

highly correlated such that it affects the ability of the regression to differentiate the effects of the independent variables independently; “sometimes to a point where we really can’t draw a conclusion” (Dietz & Kalof, 2009, p. 496).

The gender, interest and year of study distributions of the sample were questionable and not representative of University of the Witwatersrand psychology students. This could have had an effect on the extent to which results gathered by this study could be generalized and interpreted. The inability of this study to identify whether there were differences based on gender, interest in furthering studies in psychology and the different year levels might have had implications on how the results of the study could be interpreted and whether the results could differ based on additional variables. The analysis adopted for the current study only provides information on the nature of the relationships between the variables studied and the extent to which the dependent variable can be predicted by the independent variables. It does not manage to identify the effect of other extraneous variables or the interactive or combined effect variables might have on the dependant variable (Singleton, Straits & Straits, 1993).

The nature of a correlational research design may weaken the extent to which one can generalize findings, and since this study utilized a correlational research design, the inability of this design to control for extraneous variables may have had an impact on the results of the study (Christensen, 1994). It might be difficult for this design to control for relationships between independent variables as compared to experimental designs (Dietz & Kalof, 2009). A non-probability convenient sampling technique was used for this study and this technique is not the most effective technique because it is based on the willingness of respondents to respond and the sample characteristics are thus dependent on the willingness of students to participate (Singleton, Straits & Straits, 1993).

Recommendations

Some studies have argued an ambiguity in the relationship between academic success and test anxiety, neuroticism and extrinsic goal orientation, suggesting that the motivational effects of anxiety in highly intelligent students may be different and possibly positive (Chamorro-Premuzic & Furnham, 2003a). Students higher in neuroticism have been argued to have higher adaptive

and problem-solving strategies depending on the strategies adopted (McKenzie, 1989) and a combination of extrinsic goal orientation with interest and self-efficacy has been argued to have a positive impact on academic performance (Harackiewicz, et al., 1998; Kaplan & Midgley, 1997 as cited in Pintrich & Schunk, 2002; Skaalvik, 1997, as cited in Pintrich & Schunk, 2002; Weinert & Kluwe, 1986).

It was further argued that an interaction between neuroticism and a higher level superego (self-efficacy) may improve academic performance and that as long as students with extrinsic goal orientation still manage to best others and demonstrate high ability, their academic performance may be sustained (Bandura, 1997; McKenzie, 1989; Pintrich & Schunk, 2002). This argument has not been supported by the findings in the current study, but because of the level of analysis conducted, the combined effect or interactive effect of self-efficacy and extrinsic goal orientation could not be investigated. Hence a further study investigating this relationship should be carried out. Pintrich (1999) argues that there is a possibility for students to pursue simultaneous goals. An examination of these effects could thus add value and bridge a gap for future research.

Some studies also argue for a converse relationship between academic performance and extrinsic goal orientation (Barron & Harackiewicz, 2000), contesting that extrinsic goal-orientated students strive to achieve higher grades while intrinsic goal-orientated students focus more on interest than achievement. Pintrich and Garcia (1991) concur with Barron and Harackiewicz (2000), arguing that a concern with good grades has an ability to motivate students to attend lectures and increase their motivation to engage with coursework, hence contributing towards performance. Although not indicated in the current study, this could be considered for further studies. It would also be interesting to study how interest in furthering a career in psychology may have on the strategies adopted and on academic performance in a study of this nature.

A larger sample that takes into consideration culture, gender, year of study and interest in the course could provide richer information because it would allow one to identify whether there are differences based on the different categories, thus allowing for more generalisability. It would also be interesting to conduct parallel studies where students involved in courses that require

systematic rules and ones that require practical application and engagement with the subject are compared. This would also provide relatively rich information and possibly even test the extent to which the MSLQ applies differently to different courses.

Heuchert, Parker, Stumpf and Myburgh (2000) found that the factor structure in a sample of South African students was similar to a normative sample of Americans on the NEOPI-R. They also found significant mean score differences between the racial groups within South Africa on some of the domains, particularly on the facet O (Openness to experience), with white subgroups scoring higher than blacks (Heuchert, Parker, Stumpf & Myburgh, 2000). It would thus be interesting to investigate the differences between the racial groups on the variables studied. In addition, studies exploring differences in the variables studied on the basis of gender, year of study and intention to pursue a career in psychology could contribute to a deeper understanding of the factors affecting levels of motivation, learning strategies adopted and personality factors in psychology students.

As was noted above, most of the regression results produced non-significant results – this was possibly because of the sample size or because there might have been multi-collinearity effects. Further studies could not only increase the sample size but also introduce methods to correct for multi-collinearity. This would allow for the detection of effects of independent variables that are highly correlated (Dietz & Kalof, 2009). To decrease the effects of multi-collinearity, Motulsky (2002) proposes that variables highly correlated and not highly essential to the model can be eliminated, or that variables that are highly related can be combined.

Conclusions

Despite the limitations identified in the current study, it is hoped that the results found may serve as a reference point or the basis for future studies in this field, especially in the South African context where few studies of this nature have been conducted. This study was able to identify some relationships between academic performance, personality, motivation and learning strategies. Even though the results were disappointing, especially the lack of predictive

relationships between academic performance and motivation, learning strategies and personality, this suggests that further studies with larger, more representative samples are needed. Openness to experience and self-efficacy were the only variables found to have predictive relationships with academic performance in the current study. This could indicate that confidence and intellectual engagement and achievement through independence might play a significant role in academic performance for students studying psychology at the University of the Witwatersrand. This may relate to Bandura's (1997) assertion that poor performance of students may either be caused by a lack of skills or be a result of the fact that students possess the skills but lack the confidence to accomplish tasks.

Bandura (1986) argued that

Educational practices should be gauged not only by the skills and knowledge they impart for present use but also by what they do to children's beliefs about their capabilities, which affects how they approach the future. Students who develop a strong sense of self-efficacy are well equipped to educate themselves when they have to rely on their own initiative (p. 417).

Other important relationships found in the current study were the relationships between most of the motivational (intrinsic goal orientation, task value and self-efficacy) and learning strategies subscales (elaboration, critical thinking, regulation, time and study environment and effort regulation) and conscientiousness. Whilst openness to experience was expected to be significantly related to most of the MSLQ subscales, especially those considered deep learning approaches; surprisingly, this variable was found to be related to only task value. Interestingly, this was the variable that was also found to have predictive relationships with academic performance. This may thus suggest that more studies need to be conducted to further investigate these relationships.

Most of the motivational subscales (intrinsic goal orientation, task value and self-efficacy) had negative relationships with neuroticism. The learning strategy subscales, except rehearsal, also had negative relationships with neuroticism. Test anxiety had a negative significant relationship with critical thinking but a positive significant relationship with rehearsal, whilst academic performance had an inverse relationship with rehearsal but a positive relationship with critical thinking. This may have relevance for future studies suggesting that whilst critical engagement

may play a significant positive role in academic performance, rehearsal on the other hand may hamper performance since it is not a strategy that focuses on long-term sustenance.

Interestingly, even though the learning strategies; rehearsal and elaboration were deemed surface processes that could have a negative effect on academic performance, elaboration did not seem to have negative relationships with most of the motivational subscales and personality traits except for neuroticism. Only rehearsal was found to be significantly related to neuroticism and test anxiety, which are variables normally deemed to have negative effects on academic performance. These variables were not only found to have inverse relationships with variables previously deemed to have positive relationships with academic performance but also had positive relationship with each other.

The results of the study may be utilized to inform interventions for teaching and learning. Since learning is adaptable, and personality traits are inherently dynamic temperaments that interact with opportunities, challenges and experiences of the context (Bandura, 1997; Costa & McCrae, 1994), further studies in this field may further identify variables that play an important role in academic performance and these may then may be used to contribute to interventions aimed at improving long-term sustainable learning and achievement.

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APPENDICES

Appendix A: Participant Information Sheet

Dear Student

My name is Mandisa Magwaza, a Masters degree in Psychology student at the University of the Witwatersrand conducting a research in partial fulfilment of this degree. My research aims to explore the relationship between personality, motivation, learning strategies and performance, specifically in Psychology students. I hereby invite you to participate in the study.

Participating in this study will involve completing a questionnaire pack that should take about 50 minutes to an hour to complete. Your participation is completely voluntary and whether you participate or not will have no effect on your marks or any other aspect of your studies. All the information gathered will be kept confidential, and no information that identifies you will be included in the research report. No identifying information will be asked of you, except your student number in a separate sheet to link your number with your results. The process of accessing your marks is explained in the sheet that asks for your student number, and this is voluntary.

There are no foreseeable risks or benefits to taking part in this research, however if any of the questions make you feel uncomfortable, you are allowed not to answer them. If the research by any chance causes emotional disturbances please contact the Emthonjeni Centre or CCDU (011-717 9140/ 32) for assistance. Your answers will be protected and kept secure and will be processed only by myself and my supervisor. Once the study has been completed and written up, your answers will be destroyed. If you feel uncomfortable in participating in the study at any point while filling in the questionnaire you may choose to withdraw by simply returning the questionnaire uncompleted.

If you choose to take part in this research, please fill in the attached questionnaire pack and return it to the sealed box in your lecture room or at the Department of Psychology. Please detach this letter from the pack and keep it for future reference. Results of this study will be published in a summary format on the notice board opposite U306C and will be available on request from the researcher. Your participation will be greatly appreciated. Should you require any further information or have any queries please do not hesitate to contact me. My contact details are 072 876 6121; zippy.lami@gmail.com and my supervisors details are (011-717-4557; Nicole.Israel@wits.ac.za)

Yours sincerely

Mandisa Magwaza

Appendix B: Demographic Questionnaire

CODE: 0001

Please complete the following information sheet.

Age

Gender

Male	Female

Race

(For statistical purposes only)

Year of Study

Home Language

Do you intend to pursue a career in psychology?

Yes	No
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CODE: 0001

Appendix C: Request for student number

Dear student

As part of the study, I would like to ask for your permission to link your student number to your Psychology marks. Completing this section is voluntary meaning that you can provide your student number if you wish to and if you do not wish to, you may leave the space blank. Your marks will not be directly accessed by the researcher but will be linked to the code provided on your questionnaire by an independent person who will then remove your student number.

Basically once you have filled in your student numbers, it will be linked with the code at the top of this form. This thus means that once you have provided your student number, this sheet with both your number and code will be given to an independent person who will access your marks to link the marks with your student number. Once the marks have been accessed, the person accessing the marks will remove the student number and provide me with the marks linked to a code. This thus means that I will not be able at any point in time in the research to link your mark with your student number hence ensuring your anonymity and confidentiality.

Please fill you student number in the slot below only if you are willing for your student number be linked to your marks. Remember, this is voluntary.

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Thank you

Mandisa Magwaza

Appendix D: MSLQ

MSLQ Item List

The following is a list of items that make up the MSLQ (from Pintrich et al., 1991).

Part A. Motivation

The following questions ask about your motivation for and attitudes about this class. Remember there are no right or wrong answers, just answer as accurately as possible. Use the scale below to answer the questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1 2 3 4 5 6 7

*Not at all Very true
true of me of me*

1. In a class like this, I prefer course material that really challenges me so I can learn new things.
2. If I study in appropriate ways, then I will be able to learn the material in this course.
3. When I take a test I think about how poorly I am doing compared with other students.
4. I think I will be able to use what I learn in this course in other courses.
5. I believe I will receive an excellent grade in this class.
6. I'm certain I can understand the most difficult material presented in the readings for this course.
7. Getting a good grade in this class is the most satisfying thing for me right now.
8. When I take a test I think about items on other parts of the test I can't answer.
9. It is my own fault if I don't learn the material in this course.
10. It is important for me to learn the course material in this class.
11. The most important thing for me right now is improving my overall grade point average, so my main concern in this class is getting a good grade.
12. I'm confident I can learn the basic concepts taught in this course.
13. If I can, I want to get better grades in this class than most of the other students.
14. When I take tests I think of the consequences of failing.
15. I'm confident I can understand the most complex material presented by the instructor in this course.
16. In a class like this, I prefer course material that arouses my curiosity, even if it is difficult to learn.
17. I am very interested in the content area of this course.
18. If I try hard enough, then I will understand the course material.
19. I have an uneasy, upset feeling when I take an exam.
20. I'm confident I can do an excellent job on the assignments and tests in this course.
21. I expect to do well in this class.
22. The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.
23. I think the course material in this class is useful for me to learn.
24. When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.
25. If I don't understand the course material, it is because I didn't try hard enough.
26. I like the subject matter of this course.
27. Understanding the subject matter of this course is very important to me

28. I feel my heart beating fast when I take an exam.
29. I'm certain I can master the skills being taught in this class.
30. I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.
31. Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class.

Part B. Learning Strategies

The following questions ask about your learning strategies and study skills for this class. Again, there are no right or wrong answers. Answer the questions about how you study in this class as accurately as possible. Use the same scale to answer the remaining questions. If you think the statement is very true of you, circle 7; if a statement is not at all true of you, circle 1. If the statement is more or less true of you, find the number between 1 and 7 that best describes you.

1 2 3 4 5 6 7

Not at all *Very true*

True of me *of me*

32. When I study the readings for this course, I outline the material to help me organize my thoughts.
33. During class time I often miss important points because I'm thinking of other things. (reverse coded)
34. When studying for this course, I often try to explain the material to a classmate or friend.
35. I usually study in a place where I can concentrate on my course work.
36. When reading for this course, I make up questions to help focus my reading.
37. I often feel so lazy or bored when I study for this class that I quit before I finish what I planned to do. (reverse coded)
38. I often find myself questioning things I hear or read in this course to decide if I find them convincing.
39. When I study for this class, I practice saying the material to myself over and over.
40. Even if I have trouble learning the material in this class, I try to do the work on my own, without help from anyone. (reverse coded)
41. When I become confused about something I'm reading for this class, I go back and try to figure it out.
42. When I study for this course, I go through the readings and my class notes and try to find the most important ideas.
43. I make good use of my study time for this course.
44. If course readings are difficult to understand, I change the way I read the material.
45. I try to work with other students from this class to complete the course assignments.
46. When studying for this course, I read my class notes and the course readings over and over again.
47. When a theory, interpretation, or conclusion is presented in class or in the readings, I try to decide if there is good supporting evidence.
48. I work hard to do well in this class even if I don't like what we are doing.
49. I make simple charts, diagrams, or tables to help me organize course material.
50. When studying for this course, I often set aside time to discuss course material with a group of students from the class.
51. I treat the course material as a starting point and try to develop my own ideas about it.

52. I find it hard to stick to a study schedule. (reverse coded)
53. When I study for this class, I pull together information from different sources, such as lectures, readings, and discussions.
54. Before I study new course material thoroughly, I often skim it to see how it is organized.
55. I ask myself questions to make sure I understand the material I have been studying in this class.
56. I try to change the way I study in order to fit the course requirements and the instructor's teaching style.
57. I often find that I have been reading for this class but don't know what it was all about. (reverse coded)
58. I ask the instructor to clarify concepts I don't understand well.
59. I memorize key words to remind me of important concepts in this class.
60. When course work is difficult, I either give up or only study the easy parts. (reverse coded)
61. I try to think through a topic and decide what I am supposed to learn from it rather than just reading it over when studying for this course.
62. I try to relate ideas in this subject to those in other courses whenever possible.
63. When I study for this course, I go over my class notes and make an outline of important concepts.
64. When reading for this class, I try to relate the material to what I already know.
65. I have a regular place set aside for studying.
66. I try to play around with ideas of my own related to what I am learning in this course.
67. When I study for this course, I write brief summaries of the main ideas from the readings and my class notes.
68. When I can't understand the material in this course, I ask another student in this class for help.
69. I try to understand the material in this class by making connections between the readings and the concepts from the lectures.
70. I make sure that I keep up with the weekly readings and assignments for this course.
71. Whenever I read or hear an assertion or conclusion in this class, I think about possible alternatives.
72. I make lists of important items for this course and memorize the lists.
73. I attend this class regularly.
74. Even when course materials are dull and uninteresting, I manage to keep working until I finish.
75. I try to identify students in this class whom I can ask for help if necessary.
76. When studying for this course I try to determine which concepts I don't understand well.
77. I often find that I don't spend very much time on this course because of other activities. (reverse coded)
78. When I study for this class, I set goals for myself in order to direct my activities in each study period.
79. If I get confused taking notes in class, I make sure I sort it out afterwards.
80. I rarely find time to review my notes or readings before an exam. (reverse coded)
81. I try to apply ideas from course readings in other class activities such as lecture and discussion.

Table B1

*Items within the 15 MSLQ Subscales and the Subscales' Corresponding Coefficient Alphas
(modified from Duncan & McKeachie, 2005)*

Scale	Items in the Subscale	α
Motivation Subscales		
1. Intrinsic Goal Orientation	1, 16, 22, 24	.74
2. Extrinsic Goal Orientation	7, 11, 13, 30	.62
3. Task Value	4, 10, 17, 23, 26, 27	.90
4. Control of Learning Beliefs	2, 9, 18, 25	.68
5. Self-Efficacy for Learning & Performance	5, 6, 12, 15, 20, 21, 29, 31	.93
6. Test Anxiety	3, 8, 14, 19, 28	.80
Learning Strategies Subscales		
1. Rehearsal	39, 46, 59, 72	.69
2. Elaboration	53, 62, 64, 67, 69, 81	.75
3. Organization	32, 42, 49, 63	.64
4. Critical Thinking	38, 47, 51, 66, 71	.80
5. Metacognitive Self-Regulation	33r, 36, 41, 44, 54, 55, 56, 57r, 61, 76, 78, 79	.79
6. Time/Study Environmental Management	35, 43, 52r, 65, 70, 73, 77r, 80r	.76
7. Effort Regulation	37r, 48, 60r, 74	.69
8. Peer Learning	34, 45, 50	.76
9. Help Seeking	40r, 58, 68, 74	.52

Appendix E: Descriptive statistics

One-Way Frequencies

Results

The FREQ Procedure

AGE				
AGE	Frequency	Percent	Cumulative Frequency	Cumulative Percent
17	1	1.45	1	1.45
18	12	17.39	13	18.84
19	20	28.99	33	47.83
20	7	10.14	40	57.97
21	12	17.39	52	75.36
22	4	5.80	56	81.16
23	6	8.70	62	89.86
24	2	2.90	64	92.75
25	1	1.45	65	94.20
26	1	1.45	66	95.65
27	1	1.45	67	97.10
35	1	1.45	68	98.55
36	1	1.45	69	100.00

GENDER				
GENDER	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	16	23.19	16	23.19
1	53	76.81	69	100.00

RACECOD				
RACECOD	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	43	62.32	43	62.32

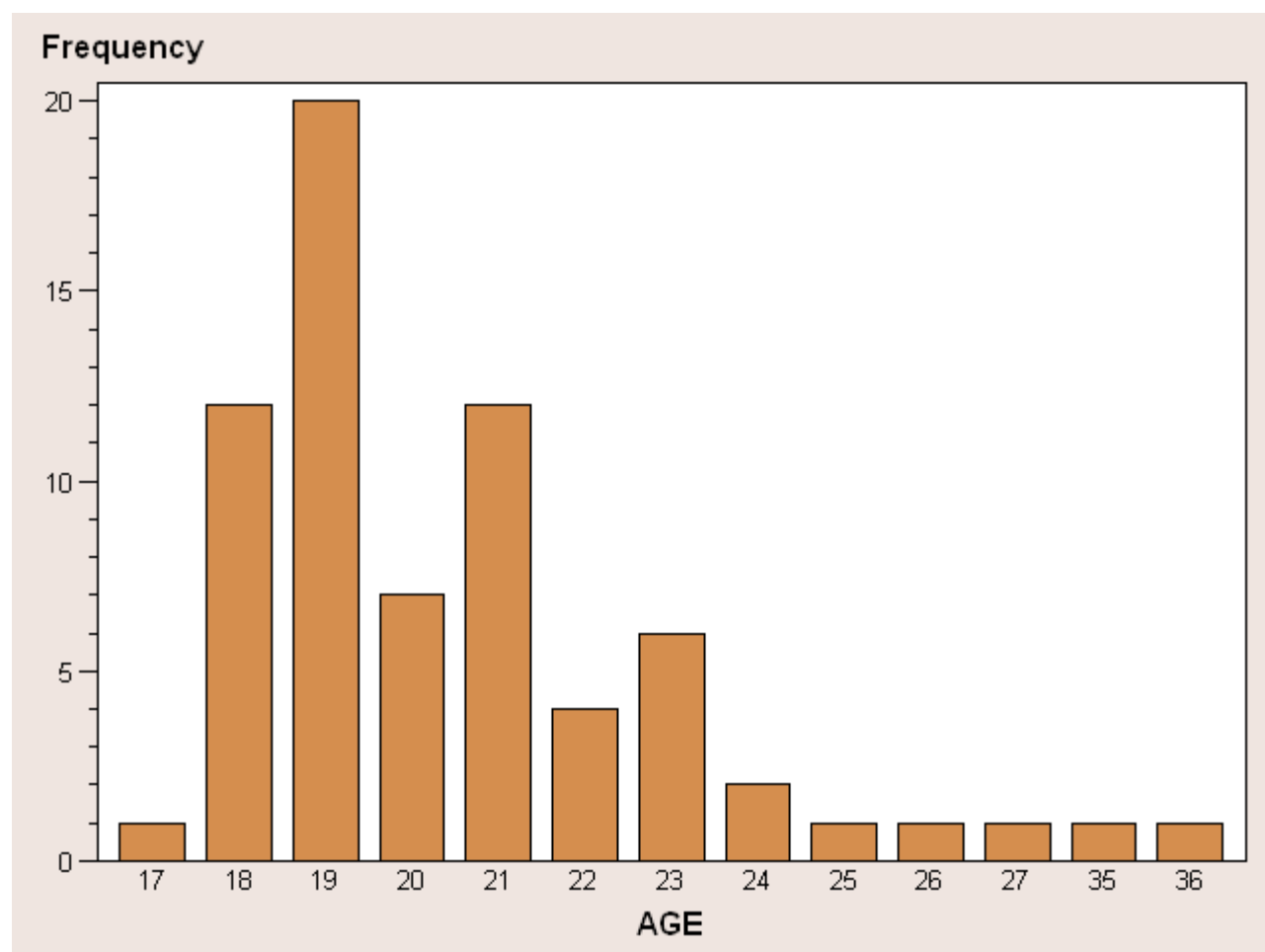
RACECOD				
RACECOD	Frequency	Percent	Cumulative Frequency	Cumulative Percent
2	26	37.68	69	100.00

YOS				
YOS	Frequency	Percent	Cumulative Frequency	Cumulative Percent
1	38	55.07	38	55.07
2	9	13.04	47	68.12
3	22	31.88	69	100.00

CAREER				
CAREER	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	24	34.78	24	34.78
1	45	65.22	69	100.00

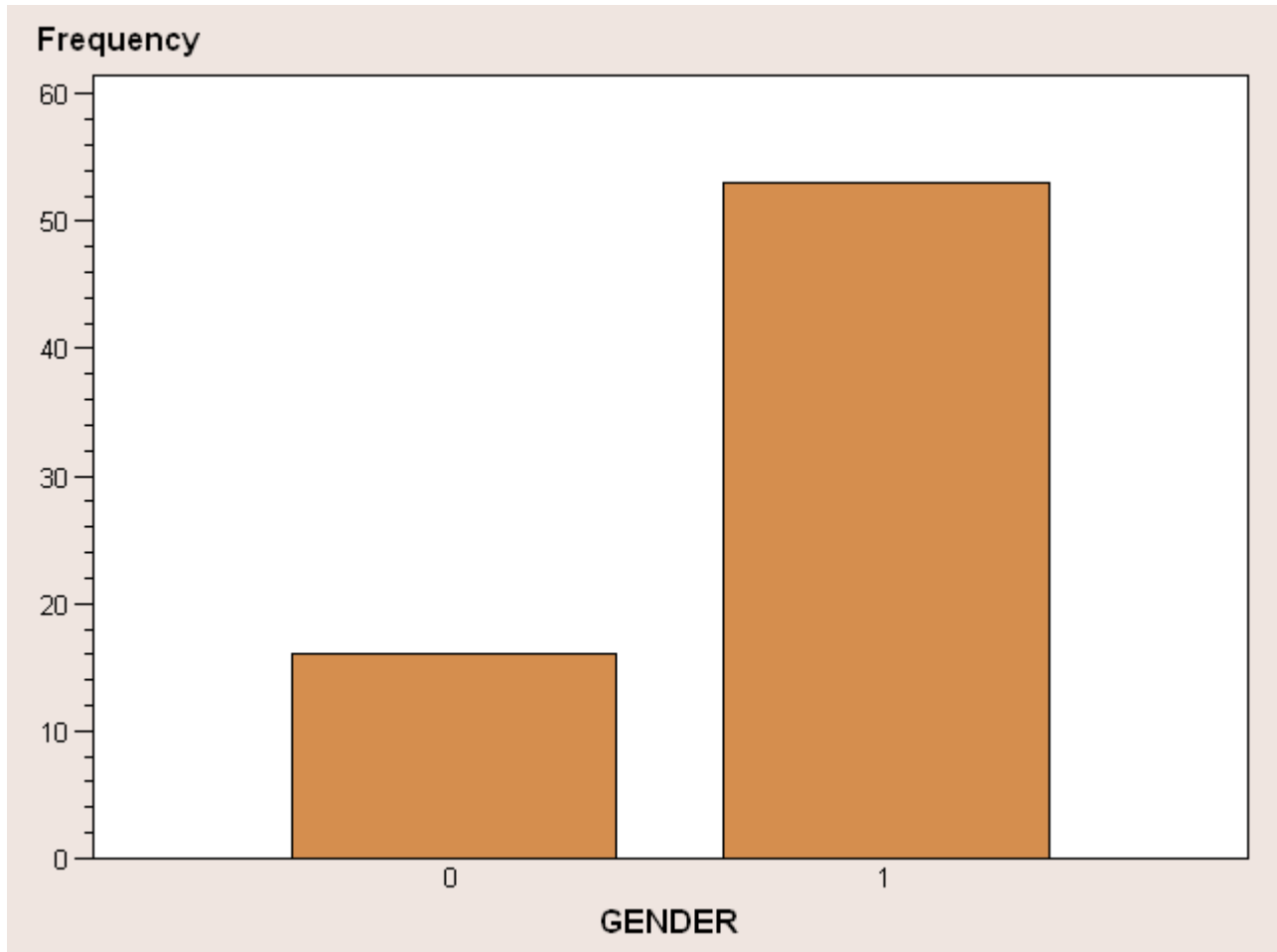
Generated by the SAS System (Local, XP_PRO) on 19APR2009 at 6:37 AM

One-Way Frequencies
Plots



[Click for description of Vertical Bar Chart of AGE](#)

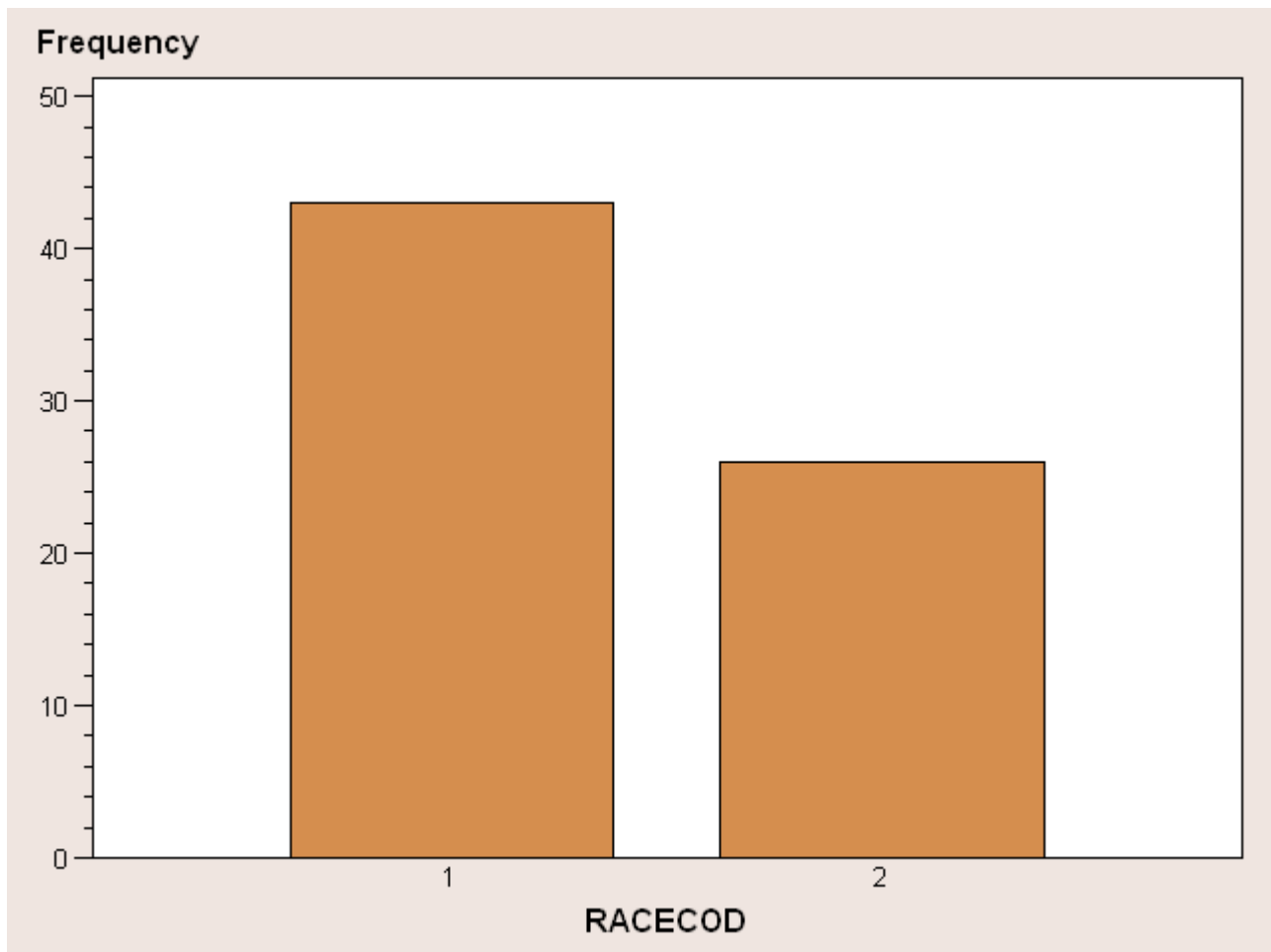
[One-Way Frequencies](#)
[Plots](#)



[Click for description of Vertical Bar Chart of GENDER](#)

Generated by the SAS System (Local, XP_PRO) on 19APR2009 at 6:37 AM

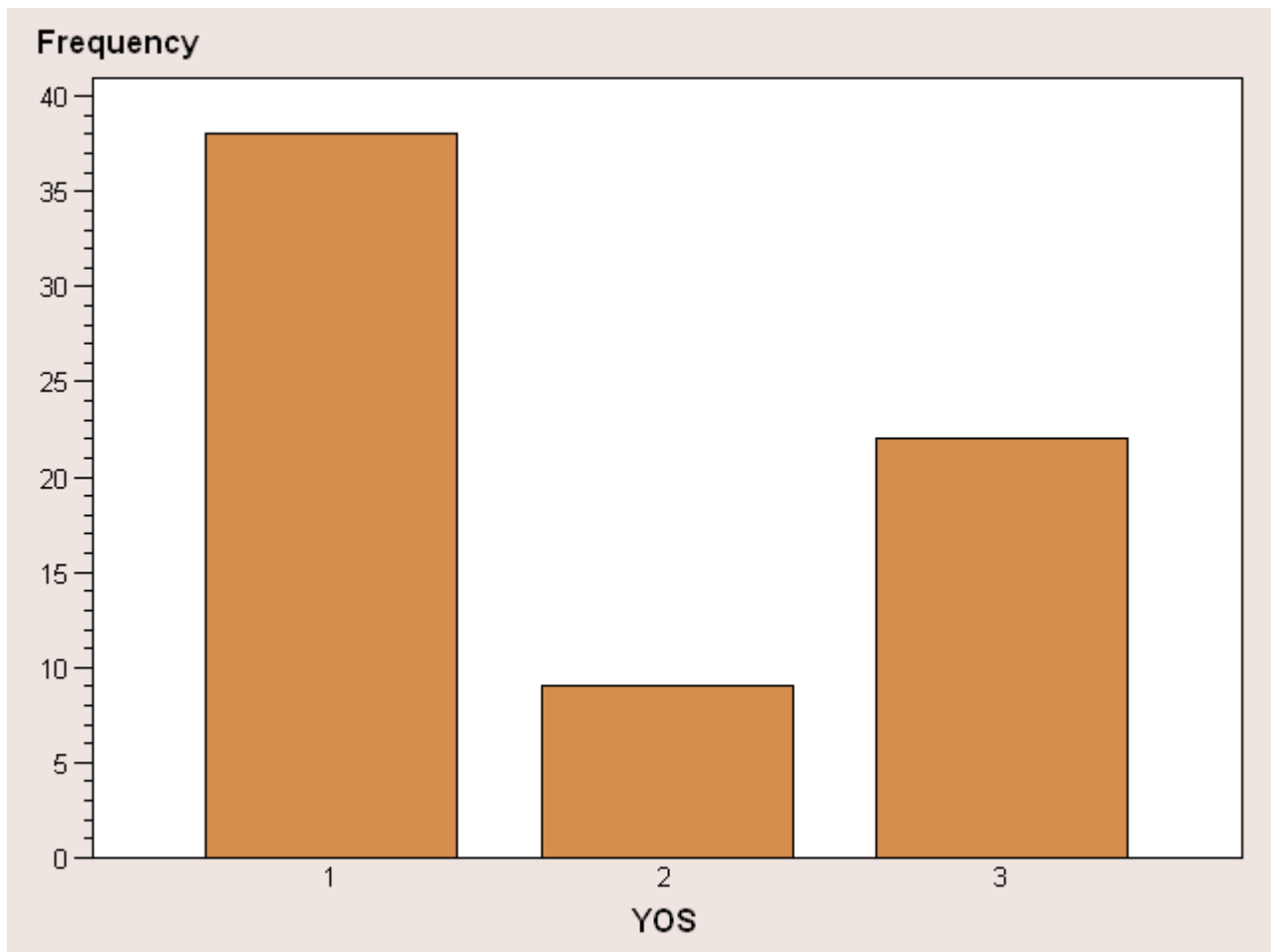
One-Way Frequencies
Plots



[Click for description of Vertical Bar Chart of RACECOD](#)

Generated by the SAS System (Local, XP_PRO) on 19APR2009 at 6:37 AM

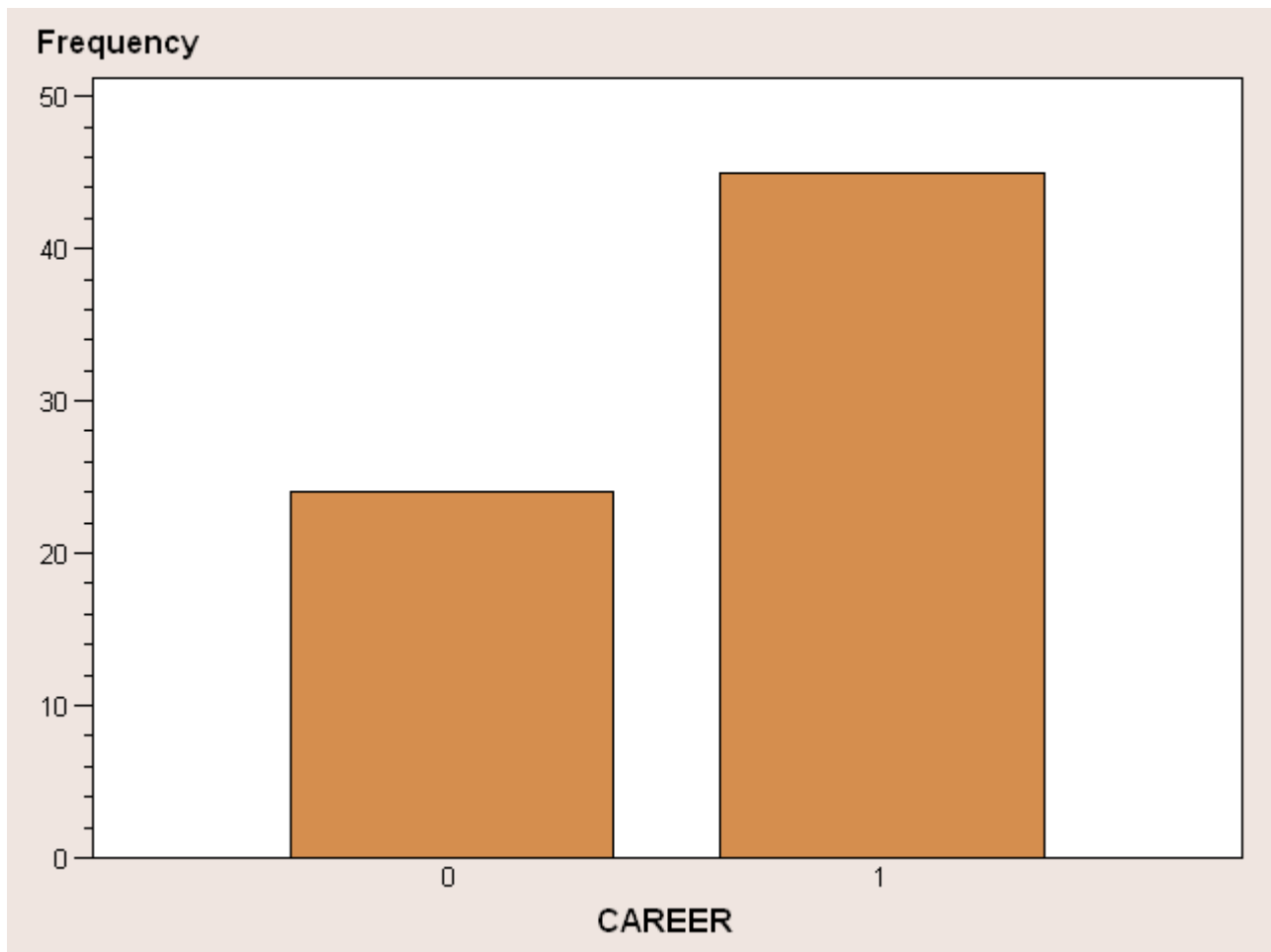
One-Way Frequencies
Plots



[Click for description of Vertical Bar Chart of YOS](#)

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One-Way Frequencies
Plots



[Click for description of Vertical Bar Chart of CAREER](#)

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Appendix F: Reliability Analysis

Appendix G: Correlation Analysis

Correlation Analysis

The CORR Procedure

9 With Variables:	REHERS ELAB ORG CTHINK REGUL TSENV EFREGUL PLEARN HSEEK
6 Variables:	INTR EXTR TASK SEFFIC CLEARN TANXIE

Covariance Matrix, DF = 68							
		INTR	EXTR	TASK	SEFFIC	CLEARN	TANXIE
REHERS	REHERS	1.05882353	8.99040921	5.81521739	5.05242967	5.24488491	10.34526854
ELAB	ELAB	21.92647059	12.62020460	28.72378517	39.76150895	11.18861893	-4.44501279
ORG	ORG	6.86764706	8.40537084	9.20524297	12.78005115	2.06521739	3.96547315
CTHINK	CTHINK	16.99019608	-0.00809889	19.48742540	32.00767263	5.69927536	-15.14961637
REGUL	REGUL	31.29901961	13.90110827	40.80775789	55.33439898	17.20183291	-17.74872123
TSENV	TSENV	13.30392157	5.88341858	13.91922421	29.05626598	6.96952259	-4.09718670
EFREGUL	EFREGUL	13.51470588	1.79347826	10.68670077	21.32800512	1.51534527	-17.21227621
PLEARN	PLEARN	6.50000000	1.14130435	8.97442455	11.02557545	-0.02365729	-8.02813299
HSEEK	HSEEK	1.94607843	3.70161978	1.33780904	7.26023018	0.82779199	2.50639386

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
REHERS	69	18.73913	5.12104	20.00000	5.00000	28.00000	REHERS
ELAB	69	31.86957	7.18641	32.00000	14.00000	42.00000	ELAB
ORG	69	20.82609	4.78034	20.00000	8.00000	28.00000	ORG
CTHINK	69	25.24638	6.81134	26.00000	5.00000	35.00000	CTHINK
REGUL	69	54.37681	11.04683	53.00000	29.00000	75.00000	REGUL
TSENV	69	38.36232	5.96552	39.00000	26.00000	50.00000	TSENV
EFREGUL	69	20.78261	5.33267	21.00000	9.00000	28.00000	EFREGUL
PLEARN	69	11.04348	5.17754	11.00000	3.00000	21.00000	PLEARN
HSEEK	69	16.55072	5.84490	16.00000	4.00000	28.00000	HSEEK

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
INTR	69	19.33333	5.46289	20.00000	8.00000	28.00000	INTR
EXTR	69	20.79710	4.66709	21.00000	11.00000	28.00000	EXTR
TASK	69	34.57971	6.56507	36.00000	12.00000	42.00000	TASK
SEFFIC	69	43.08696	8.23504	43.00000	17.00000	56.00000	SEFFIC
CLEARN	69	23.20290	4.20986	24.00000	10.00000	28.00000	CLEARN
TANXIE	69	18.30435	8.51867	18.00000	5.00000	35.00000	TANXIE

Pearson Correlation Coefficients, N = 69 Prob > r under H0: Rho=0						
	INTR	EXTR	TASK	SEFFIC	CLEARN	TANXIE
REHERS	0.03785	0.37616	0.17297	0.11981	0.24328	0.23714
REHERS	0.7575	0.0014	0.1552	0.3268	0.0440	0.0498
ELAB	0.55851	0.37628	0.60882	0.67187	0.36983	-0.07261
ELAB	<.0001	0.0014	<.0001	<.0001	0.0018	0.5532
ORG	0.26298	0.37675	0.29332	0.32464	0.10262	0.09738
ORG	0.0290	0.0014	0.0144	0.0065	0.4014	0.4260
CTHINK	0.45661	-0.00025	0.43580	0.57063	0.19876	-0.26109
CTHINK	<.0001	0.9983	0.0002	<.0001	0.1016	0.0302
REGUL	0.51865	0.26963	0.56269	0.60826	0.36989	-0.18861
REGUL	<.0001	0.0251	<.0001	<.0001	0.0018	0.1207
TSENV	0.40823	0.21132	0.35541	0.59146	0.27752	-0.08062
TSENV	0.0005	0.0813	0.0027	<.0001	0.0210	0.5102
EFREGUL	0.46392	0.07206	0.30525	0.48567	0.06750	-0.37890
EFREGUL	<.0001	0.5562	0.0108	<.0001	0.5816	0.0013
PLEARN	0.22981	0.04723	0.26402	0.25859	-0.00109	-0.18202
PLEARN	0.0575	0.7000	0.0284	0.0319	0.9929	0.1344
HSEEK	0.06095	0.13570	0.03486	0.15084	0.03364	0.05034
HSEEK	0.6188	0.2663	0.7761	0.2160	0.7838	0.6812

Spearman Correlation Coefficients, N = 69 Prob > r under H0: Rho=0						
	INTR	EXTR	TASK	SEFFIC	CLEARN	TANXIE
REHERS	0.00096	0.34838	0.13042	0.09847	0.16172	0.22725
REHERS	0.9937	0.0034	0.2854	0.4208	0.1843	0.0604
ELAB	0.51896	0.34833	0.55860	0.65464	0.26227	-0.10206
ELAB	<.0001	0.0034	<.0001	<.0001	0.0295	0.4040
ORG	0.26623	0.39867	0.28411	0.36200	0.08839	0.09800
ORG	0.0270	0.0007	0.0180	0.0022	0.4702	0.4231
CTHINK	0.43678	0.05242	0.47656	0.56815	0.24703	-0.26291
CTHINK	0.0002	0.6688	<.0001	<.0001	0.0407	0.0291
REGUL	0.52173	0.24079	0.57986	0.63444	0.30329	-0.20709
REGUL	<.0001	0.0463	<.0001	<.0001	0.0113	0.0878
TSENV	0.38132	0.18947	0.36488	0.59982	0.26131	-0.10970
TSENV	0.0012	0.1189	0.0021	<.0001	0.0301	0.3696
EFREGUL	0.43517	0.05680	0.35683	0.53864	0.12112	-0.41350
EFREGUL	0.0002	0.6429	0.0026	<.0001	0.3215	0.0004
PLEARN	0.21046	0.02416	0.28690	0.29261	0.08174	-0.20402
PLEARN	0.0826	0.8438	0.0168	0.0147	0.5043	0.0927
HSEEK	0.06001	0.08074	0.08557	0.16732	0.00853	0.00635
HSEEK	0.6242	0.5096	0.4845	0.1694	0.9446	0.9587

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Correlation Analysis

The CORR Procedure

6 With Variables:

INTR EXTR TASK SEFFIC CLEARN TANXIE

5 Variables:

NEURO EXTRA OPEN AGREEAB CONSCIEN

Covariance Matrix, DF = 68

		NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
INTR	INTR	-61.1764706	18.4950980	2.3431373	2.5784314	79.7107843
EXTR	EXTR	11.6675192	17.4153879	-10.5880222	4.9484228	7.1779625
TASK	TASK	-30.1508951	23.9812447	34.3838448	25.3889599	54.5398551
SEFFIC	SEFFIC	-82.2608696	58.0530691	33.6994885	15.5914322	104.8228900
CLEARN	CLEARN	-17.2410486	6.3640239	9.7203751	-1.0954817	20.4249787
TANXIE	TANXIE	103.0134271	-19.0127877	-34.0664962	8.3126598	-53.4066496

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
INTR	69	19.33333	5.46289	20.00000	8.00000	28.00000	INTR
EXTR	69	20.79710	4.66709	21.00000	11.00000	28.00000	EXTR
TASK	69	34.57971	6.56507	36.00000	12.00000	42.00000	TASK
SEFFIC	69	43.08696	8.23504	43.00000	17.00000	56.00000	SEFFIC
CLEARN	69	23.20290	4.20986	24.00000	10.00000	28.00000	CLEARN
TANXIE	69	18.30435	8.51867	18.00000	5.00000	35.00000	TANXIE
NEURO	69	96.95652	24.89474	97.00000	27.00000	152.00000	NEURO
EXTRA	69	110.23188	22.07084	110.00000	53.00000	151.00000	EXTRA
OPEN	69	119.07246	20.32191	121.00000	53.00000	158.00000	OPEN
AGREEAB	69	110.46377	18.15260	112.00000	52.00000	146.00000	AGREEAB
CONSCIEN	69	116.50725	25.82100	116.00000	56.00000	176.00000	CONSCIEN

Pearson Correlation Coefficients, N = 69 Prob > r under H0: Rho=0					
	NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
INTR	-0.44984	0.15340	0.02111	0.02600	0.56510
INTR	0.0001	0.2083	0.8633	0.8321	<.0001
EXTR	0.10042	0.16907	-0.11164	0.05841	0.05956
EXTR	0.4116	0.1649	0.3611	0.6336	0.6268

TASK	-0.18448	0.16551	0.25772	0.21304	0.32174
TASK	0.1291	0.1741	0.0325	0.0788	0.0070
SEFFIC	-0.40125	0.31940	0.20137	0.10430	0.49297
SEFFIC	0.0006	0.0075	0.0971	0.3937	<.0001
CLEARN	-0.16451	0.06849	0.11362	-0.01434	0.18790
CLEARN	0.1768	0.5760	0.3526	0.9069	0.1221
TANXIE	0.48575	-0.10112	-0.19678	0.05376	-0.24280
TANXIE	<.0001	0.4084	0.1051	0.6609	0.0444

Spearman Correlation Coefficients, N = 69 Prob > r under H0: Rho=0					
	NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
INTR	-0.41228	0.11353	0.04737	0.05060	0.51023
INTR	0.0004	0.3530	0.6991	0.6796	<.0001
EXTR	0.07975	0.17313	-0.07676	0.12753	0.00923
EXTR	0.5148	0.1548	0.5307	0.2964	0.9400
TASK	-0.24437	0.15662	0.21091	0.20152	0.34817
TASK	0.0430	0.1987	0.0819	0.0968	0.0034
SEFFIC	-0.39477	0.33127	0.15795	0.14818	0.49028
SEFFIC	0.0008	0.0054	0.1949	0.2243	<.0001
CLEARN	-0.15021	0.05619	0.16423	0.02564	0.21918
CLEARN	0.2180	0.6465	0.1775	0.8343	0.0704
TANXIE	0.49722	-0.12219	-0.25066	0.04914	-0.30644
TANXIE	<.0001	0.3172	0.0378	0.6884	0.0104

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Correlation Analysis

The CORR Procedure

9 With Variables:	REHERS ELAB ORG CTHINK REGUL TSENV EFREGUL PLEARN HSEEK
5 Variables:	NEURO EXTRA OPEN AGREEAB CONSCIEN

Covariance Matrix, DF = 68						
		NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
REHERS	REHERS	22.0767263	8.0172634	-18.8484655	20.4904092	9.1342711
ELAB	ELAB	-60.6675192	49.1630435	19.1860614	32.3113811	93.6259591
ORG	ORG	-0.8753197	16.9232737	-2.0754476	12.3612532	26.0306905
CTHINK	CTHINK	-70.6067775	40.4567349	30.3348252	9.2664109	87.4026002
REGUL	REGUL	-99.4833760	71.3231032	3.4869991	29.3667945	158.6589940
TSENV	TSENV	-37.6751918	40.4882779	-0.8501705	24.7412617	105.0635124
EFREGUL	EFREGUL	-50.8625320	17.7570332	10.1924552	21.5728900	90.4060102
PLEARN	PLEARN	-35.7480818	33.2985934	-13.3120205	10.2148338	23.2129156
HSEEK	HSEEK	-4.6815857	39.7086530	-9.4669650	38.1526002	18.3635976

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
REHERS	69	18.73913	5.12104	20.00000	5.00000	28.00000	REHERS
ELAB	69	31.86957	7.18641	32.00000	14.00000	42.00000	ELAB
ORG	69	20.82609	4.78034	20.00000	8.00000	28.00000	ORG
CTHINK	69	25.24638	6.81134	26.00000	5.00000	35.00000	CTHINK
REGUL	69	54.37681	11.04683	53.00000	29.00000	75.00000	REGUL
TSENV	69	38.36232	5.96552	39.00000	26.00000	50.00000	TSENV
EFREGUL	69	20.78261	5.33267	21.00000	9.00000	28.00000	EFREGUL
PLEARN	69	11.04348	5.17754	11.00000	3.00000	21.00000	PLEARN
HSEEK	69	16.55072	5.84490	16.00000	4.00000	28.00000	HSEEK
NEURO	69	96.95652	24.89474	97.00000	27.00000	152.00000	NEURO
EXTRA	69	110.23188	22.07084	110.00000	53.00000	151.00000	EXTRA
OPEN	69	119.07246	20.32191	121.00000	53.00000	158.00000	OPEN
AGREEAB	69	110.46377	18.15260	112.00000	52.00000	146.00000	AGREEAB
CONSCIEN	69	116.50725	25.82100	116.00000	56.00000	176.00000	CONSCIEN

Pearson Correlation Coefficients, N = 69
 Prob > |r| under H0: Rho=0

	NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
REHERS	0.17317	0.07093	-0.18111	0.22042	0.06908
REHERS	0.1548	0.5625	0.1364	0.0688	0.5728
ELAB	-0.33911	0.30996	0.13137	0.24769	0.50456
ELAB	0.0044	0.0095	0.2819	0.0402	<.0001
ORG	-0.00736	0.16040	-0.02136	0.14245	0.21089
ORG	0.9522	0.1880	0.8617	0.2430	0.0820
CTHINK	-0.41640	0.26912	0.21915	0.07494	0.49696
CTHINK	0.0004	0.0253	0.0704	0.5405	<.0001
REGUL	-0.36175	0.29253	0.01553	0.14645	0.55623
REGUL	0.0023	0.0147	0.8992	0.2299	<.0001
TSENV	-0.25369	0.30751	-0.00701	0.22847	0.68207
TSENV	0.0354	0.0102	0.9544	0.0590	<.0001
EFREGUL	-0.38313	0.15087	0.09405	0.22286	0.65657
EFREGUL	0.0012	0.2159	0.4421	0.0657	<.0001
PLEARN	-0.27735	0.29140	-0.12652	0.10868	0.17363
PLEARN	0.0210	0.0151	0.3002	0.3740	0.1536
HSEEK	-0.03217	0.30781	-0.07970	0.35959	0.12168
HSEEK	0.7930	0.0101	0.5150	0.0024	0.3193

Spearman Correlation Coefficients, N = 69
Prob > |r| under H0: Rho=0

	NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
REHERS	0.14520	0.06326	-0.20869	0.23195	0.06613
REHERS	0.2339	0.6056	0.0853	0.0551	0.5893
ELAB	-0.32421	0.33930	0.11608	0.25425	0.50377
ELAB	0.0066	0.0043	0.3422	0.0350	<.0001
ORG	-0.04676	0.14654	0.00388	0.19623	0.30787
ORG	0.7028	0.2295	0.9748	0.1061	0.0101
CTHINK	-0.35388	0.26220	0.22227	0.11186	0.49397

Spearman Correlation Coefficients, N = 69 Prob > r under H0: Rho=0					
	NEURO	EXTRA	OPEN	AGREEAB	CONSCIEN
CTHINK	0.0029	0.0295	0.0664	0.3601	<.0001
REGUL	-0.34308	0.31943	0.03614	0.22449	0.59067
REGUL	0.0039	0.0075	0.7681	0.0637	<.0001
TSENV	-0.24535	0.37573	0.06868	0.29374	0.64898
TSENV	0.0422	0.0015	0.5750	0.0143	<.0001
EFREGUL	-0.39664	0.18514	0.16746	0.23710	0.69083
EFREGUL	0.0007	0.1278	0.1690	0.0498	<.0001
PLEARN	-0.28574	0.29698	-0.12672	0.05903	0.17455
PLEARN	0.0173	0.0132	0.2994	0.6299	0.1514
HSEEK	-0.10771	0.29089	-0.09967	0.34017	0.18719
HSEEK	0.3783	0.0153	0.4152	0.0042	0.1235

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Correlation Analysis

The CORR Procedure

5 With Variables:	NEURO EXTRA OPEN AGREEAB CONSCIEN
1 Variables:	PERFORM

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
NEURO	69	96.95652	24.89474	97.00000	27.00000	152.00000	NEURO
EXTRA	69	110.23188	22.07084	110.00000	53.00000	151.00000	EXTRA
OPEN	69	119.07246	20.32191	121.00000	53.00000	158.00000	OPEN
AGREEAB	69	110.46377	18.15260	112.00000	52.00000	146.00000	AGREEAB
CONSCIEN	69	116.50725	25.82100	116.00000	56.00000	176.00000	CONSCIEN
PERFORM	26	122.53846	29.56245	127.00000	55.00000	173.00000	PERFORM

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
NEURO	-0.29885
NEURO	0.1381
	26
EXTRA	0.41111
EXTRA	0.0369
	26
OPEN	0.45058
OPEN	0.0209
	26
AGREEAB	0.29604
AGREEAB	0.1420
	26
CONSCIEN	0.24737
CONSCIEN	0.2231
	26

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
NEURO	-0.34156
NEURO	0.0877
	26
EXTRA	0.43315
EXTRA	0.0271
	26
OPEN	0.41023
OPEN	0.0374

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
	26
AGREEAB	0.20342
AGREEAB	0.3189
	26
CONSCIEN	0.28457
CONSCIEN	0.1588
	26

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Correlation Analysis

The CORR Procedure

9 With Variables:	REHERS ELAB ORG CTHINK REGUL TSENV EFREGUL PLEARN HSEEK
1 Variables:	PERFORM

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
REHERS	69	18.73913	5.12104	20.00000	5.00000	28.00000	REHERS
ELAB	69	31.86957	7.18641	32.00000	14.00000	42.00000	ELAB
ORG	69	20.82609	4.78034	20.00000	8.00000	28.00000	ORG
CTHINK	69	25.24638	6.81134	26.00000	5.00000	35.00000	CTHINK
REGUL	69	54.37681	11.04683	53.00000	29.00000	75.00000	REGUL
TSENV	69	38.36232	5.96552	39.00000	26.00000	50.00000	TSENV
EFREGUL	69	20.78261	5.33267	21.00000	9.00000	28.00000	EFREGUL
PLEARN	69	11.04348	5.17754	11.00000	3.00000	21.00000	PLEARN
HSEEK	69	16.55072	5.84490	16.00000	4.00000	28.00000	HSEEK
PERFORM	26	122.53846	29.56245	127.00000	55.00000	173.00000	PERFORM

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
REHERS	-0.32203
REHERS	0.1086
	26
ELAB	0.28638
ELAB	0.1561
	26
ORG	-0.28014
ORG	0.1657
	26
CTHINK	0.36293
CTHINK	0.0684
	26
REGUL	0.14199
REGUL	0.4890
	26
TSENV	0.23905
TSENV	0.2396
	26
EFREGUL	0.26450
EFREGUL	0.1916
	26
PLEARN	-0.14996
PLEARN	0.4647
	26
HSEEK	0.22345
HSEEK	0.2725

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
	26

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
REHERS	-0.39606
REHERS	0.0452
	26
ELAB	0.33802
ELAB	0.0912
	26
ORG	-0.30304
ORG	0.1324
	26
CTHINK	0.48384
CTHINK	0.0123
	26
REGUL	0.11663
REGUL	0.5704
	26
TSENV	0.21946
TSENV	0.2814
	26
EFREGUL	0.38562
EFREGUL	0.0517
	26
PLEARN	-0.03282

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
PLEARN	0.8736 26
HSEEK	0.17137
HSEEK	0.4026 26

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Correlation Analysis

The CORR Procedure

6 With Variables:	INTR EXTR TASK SEFFIC CLEARN TANXIE
1 Variables:	PERFORM

Simple Statistics							
Variable	N	Mean	Std Dev	Median	Minimum	Maximum	Label
INTR	69	19.33333	5.46289	20.00000	8.00000	28.00000	INTR
EXTR	69	20.79710	4.66709	21.00000	11.00000	28.00000	EXTR
TASK	69	34.57971	6.56507	36.00000	12.00000	42.00000	TASK
SEFFIC	69	43.08696	8.23504	43.00000	17.00000	56.00000	SEFFIC
CLEARN	69	23.20290	4.20986	24.00000	10.00000	28.00000	CLEARN
TANXIE	69	18.30435	8.51867	18.00000	5.00000	35.00000	TANXIE
PERFORM	26	122.53846	29.56245	127.00000	55.00000	173.00000	PERFORM

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
INTR	0.21487
INTR	0.2918 26

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
EXTR	-0.04012
EXTR	0.8457
	26
TASK	0.20077
TASK	0.3254
	26
SEFFIC	0.32054
SEFFIC	0.1104
	26
CLEARN	0.04777
CLEARN	0.8167
	26
TANXIE	-0.27753
TANXIE	0.1698
	26

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
INTR	0.21875
INTR	0.2830
	26
EXTR	-0.09737
EXTR	0.6361
	26
TASK	0.16028
TASK	0.4341

Spearman Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations	
	PERFORM
	26
SEFFIC	0.30999
SEFFIC	0.1233
	26
CLEARN	0.07721
CLEARN	0.7077
	26
TANXIE	-0.34213
TANXIE	0.0871
	26

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Appendix H: Regression Analysis

Linear Regression Results
 The REG Procedure
 Model: Linear_Regression_Model
 Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Forward Selection: Step 1
 Variable SEFFIC Entered: R-Square = 0.1027 and C(p) = -0.5838

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2244.78701	2244.78701	2.75	0.1104
Error	24	19604	816.81977		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	76.30677	28.44555	5877.91897	7.20	0.0130
SEFFIC	1.08682	0.65559	2244.78701	2.75	0.1104

Bounds on condition number: 1, 1
 Forward Selection: Step 2
 Variable CLEARN Entered: R-Square = 0.1902 and C(p) = -0.6725

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	4156.64798	2078.32399	2.70	0.0883
Error	23	17692	769.20929		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	95.76402	30.23746	7715.40260	10.03	0.0043
SEFFIC	2.24026	0.96955	4106.78642	5.34	0.0302
CLEARN	-2.85971	1.81391	1911.86097	2.49	0.1286

Bounds on condition number: 2.3225, 9.29
 No other variable met the 0.5000 significance level for entry into the model.

Summary of Forward Selection								
Step	Variable Entered	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	SEFFIC	SEFFIC	1	0.1027	0.1027	-0.5838	2.75	0.1104
2	CLEARN	CLEARN	2	0.0875	0.1902	-0.6725	2.49	0.1286

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Linear Regression Results
The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	4156.64798	2078.32399	2.70	0.0883
Error	23	17692	769.20929		
Corrected Total	25	21848			

Root MSE	27.73462	R-Square	0.1902
Dependent Mean	122.53846	Adj R-Sq	0.1198
Coeff Var	22.63340		

Parameter Estimates													
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	95% Confidence Limits	
Intercept	Intercept	1	95.76402	30.23746	3.17	0.0043	0	.	.	.	.	33.21306	158.31497
SEFFIC	SEFFIC	1	2.24026	0.96955	2.31	0.0302	0.66072	0.10274	0.10274	0.18797	0.18840	0.23460	4.24593

Parameter Estimates													
Variable	Label	D F	Parameter Estimate	Standard Error	t Value	Pr > t	Standard ized Estimate	Squar ed Semi- partia l Corr Type I	Squar ed Parti al Corr Type I	Squar ed Semi- partia l Corr Type II	Squar ed Parti al Corr Type II	95% Confidence Limits	
CLEARN	CLEARN	1	-2.85971	1.81391	-1.58	0.1286	-0.45081	0.08751	0.09753	0.08751	0.09753	-6.61206	0.89265

Covariance of Estimates				
Variable	Label	Intercept	SEFFIC	CLEARN
Intercept	Intercept	914.30403919	-8.187840698	-22.38674787
SEFFIC	SEFFIC	-8.187840698	0.9400281968	-1.327106465
CLEARN	CLEARN	-22.38674787	-1.327106465	3.2902651597

Correlation of Estimates				
Variable	Label	Intercept	SEFFIC	CLEARN
Intercept	Intercept	1.0000	-0.2793	-0.4082
SEFFIC	SEFFIC	-0.2793	1.0000	-0.7546
CLEARN	CLEARN	-0.4082	-0.7546	1.0000

Collinearity Diagnostics					
Number	Eigenvalue	Condition Index	Proportion of Variation		
			Intercept	SEFFIC	CLEARN
1	2.96906	1.00000	0.00362	0.00188	0.00170
2	0.02192	11.63706	0.97881	0.16578	0.08228
3	0.00901	18.14997	0.01757	0.83234	0.91602

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Linear Regression Results

The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26

Number of Observations with Missing Values 43

Forward Selection: Step 1
Variable CTHINK Entered: R-Square = 0.1317 and C(p) = 4.7485

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	2877.80280	2877.80280	3.64	0.0684
Error	24	18971	790.44411		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	88.76854	18.53744	18125	22.93	<.0001
CTHINK	1.35706	0.71122	2877.80280	3.64	0.0684

Bounds on condition number: 1, 1
Forward Selection: Step 2
Variable ORG Entered: R-Square = 0.2514 and C(p) = 3.0613

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	5492.83193	2746.41597	3.86	0.0358
Error	23	16356	711.11433		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	119.76843	23.88463	17881	25.14	<.0001
ORG	-1.92392	1.00327	2615.02913	3.68	0.0677
CTHINK	1.57730	0.68429	3778.17950	5.31	0.0305

Bounds on condition number: 1.029, 4.1159
Forward Selection: Step 3
Variable ELAB Entered: R-Square = 0.2828 and C(p) = 4.0953

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	6177.94537	2059.31512	2.89	0.0583
Error	22	15671	712.29619		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	105.78839	27.83199	10291	14.45	0.0010
ELAB	1.06252	1.08339	685.11343	0.96	0.3374
ORG	-2.19122	1.04044	3159.36977	4.44	0.0468
CTHINK	1.07333	0.85621	1119.34949	1.57	0.2232

Bounds on condition number: 1.7255, 13.316

Forward Selection: Step 4

Variable REHERS Entered: R-Square = 0.3183 and C(p) = 5.0000

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	6954.77801	1738.69450	2.45	0.0777
Error	21	14894	709.22303		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	118.81604	30.43396	10810	15.24	0.0008
REHERS	-1.45286	1.38820	776.83265	1.10	0.3072
ELAB	1.37174	1.12070	1062.53698	1.50	0.2345
ORG	-1.62244	1.17184	1359.52215	1.92	0.1807
CTHINK	0.78217	0.89852	537.44057	0.76	0.3939

Bounds on condition number: 1.8543, 26.022

All variables have been entered into the model.

Summary of Forward Selection								
Step	Variable Entered	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	CTHINK	CTHINK	1	0.1317	0.1317	4.7485	3.64	0.0684
2	ORG	ORG	2	0.1197	0.2514	3.0613	3.68	0.0677
3	ELAB	ELAB	3	0.0314	0.2828	4.0953	0.96	0.3374
4	REHERS	REHERS	4	0.0356	0.3183	5.0000	1.10	0.3072

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The REG Procedure
 Model: Linear_Regression_Model
 Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	6954.77801	1738.69450	2.45	0.0777
Error	21	14894	709.22303		
Corrected Total	25	21848			

Root MSE	26.63124	R-Square	0.3183
Dependent Mean	122.53846	Adj R-Sq	0.1885
Coeff Var	21.73297		

Parameter Estimates													
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	95% Confidence Limits	
Intercept	Intercept	1	118.81604	30.43396	3.90	0.0008	0	.	.	.	.	55.52515	182.10693
REHERS	REHERS	1	-1.45286	1.38820	-1.05	0.3072	-0.22822	0.10371	0.10371	0.03556	0.04957	-4.33978	1.43406
ELAB	ELAB	1	1.37174	1.12070	1.22	0.2345	0.30030	0.13607	0.15181	0.04863	0.06659	-0.95889	3.70236
ORG	ORG	1	-1.62244	1.17184	-1.38	0.1807	-0.29595	0.05395	0.07096	0.06223	0.08365	-4.05940	0.81453
CTHINK	CTHINK	1	0.78217	0.89852	0.87	0.3939	0.20918	0.02460	0.03483	0.02460	0.03483	-1.08640	2.65074

Covariance of Estimates

Variable	Label	Intercept	REHERS	ELAB	ORG	CTHINK
Intercept	Intercept	926.2260588	-17.28008339	-11.69905884	-5.541981249	-5.612004356
REHERS	REHERS	-17.28008339	1.927098857	-0.410147575	-0.754441684	0.3862031233
ELAB	ELAB	-11.69905884	-0.410147575	1.2559705569	-0.13343761	-0.636517677
ORG	ORG	-5.541981249	-0.754441684	-0.13343761	1.3731982368	-0.126662024
CTHINK	CTHINK	-5.612004356	0.3862031233	-0.636517677	-0.126662024	0.8073338728

Correlation of Estimates						
Variable	Label	Intercept	REHERS	ELAB	ORG	CTHINK
Intercept	Intercept	1.0000	-0.4090	-0.3430	-0.1554	-0.2052
REHERS	REHERS	-0.4090	1.0000	-0.2636	-0.4638	0.3096
ELAB	ELAB	-0.3430	-0.2636	1.0000	-0.1016	-0.6321
ORG	ORG	-0.1554	-0.4638	-0.1016	1.0000	-0.1203
CTHINK	CTHINK	-0.2052	0.3096	-0.6321	-0.1203	1.0000

Collinearity Diagnostics							
Number	Eigenvalue	Condition Index	Proportion of Variation				
			Intercept	REHERS	ELAB	ORG	CTHINK
1	4.82900	1.00000	0.00124	0.00174	0.00098918	0.00212	0.00202
2	0.09344	7.18897	0.00049397	0.13336	0.01293	0.07195	0.27724
3	0.03789	11.28915	0.11185	0.16603	0.02154	0.87860	0.03019
4	0.02237	14.69128	0.75944	0.59276	0.00223	0.04154	0.19744
5	0.01730	16.70688	0.12698	0.10611	0.96231	0.00579	0.49312

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Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Forward Selection: Step 1

Variable EFREGUL Entered: R-Square = 0.0700 and C(p) = -0.8152

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	1528.48139	1528.48139	1.81	0.1916
Error	24	20320	846.66584		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	94.38250	21.71851	15990	18.89	0.0002
EFREGUL	1.36070	1.01272	1528.48139	1.81	0.1916

Bounds on condition number: 1, 1

Forward Selection: Step 2

Variable HSEEK Entered: R-Square = 0.0984 and C(p) = 0.5373

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	2149.58602	1074.79301	1.25	0.3039
Error	23	19699	856.47285		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	86.74577	23.61307	11559	13.50	0.0013
EFREGUL	1.16181	1.04500	1058.65512	1.24	0.2777
HSEEK	0.88824	1.04305	621.10464	0.73	0.4032

Bounds on condition number: 1.0526, 4.2103

Forward Selection: Step 3

Variable PLEARN Entered: R-Square = 0.1218 and C(p) = 2.0042

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	2660.93619	886.97873	1.02	0.4041
Error	22	19188	872.16024		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	98.32236	28.22004	10587	12.14	0.0021

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
EFREGUL	1.12062	1.05589	982.36007	1.13	0.3001
PLEARN	-1.23922	1.61840	511.35016	0.59	0.4520
HSEEK	0.94587	1.05525	700.71989	0.80	0.3798

Bounds on condition number: 1.058, 9.359

No other variable met the 0.5000 significance level for entry into the model.

Summary of Forward Selection								
Step	Variable Entered	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	EFREGUL	EFREGUL	1	0.0700	0.0700	-0.8152	1.81	0.1916
2	HSEEK	HSEEK	2	0.0284	0.0984	0.5373	0.73	0.4032
3	PLEARN	PLEARN	3	0.0234	0.1218	2.0042	0.59	0.4520

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Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	2660.93619	886.97873	1.02	0.4041
Error	22	19188	872.16024		
Corrected Total	25	21848			

Root MSE	29.53236	R-Square	0.1218
Dependent Mean	122.53846	Adj R-Sq	0.0020
Coeff Var	24.10048		

Parameter Estimates

Variable	Label	D F	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	95% Confidence Limits	
Intercept	Intercept	1	98.32236	28.22004	3.48	0.0021	0	.	.	.	.	39.79758	156.84714
EFREGUL	EFREGUL	1	1.12062	1.05589	1.06	0.3001	0.21783	0.06996	0.06996	0.04496	0.04870	-1.06917	3.31041
PLEARN	PLEARN	1	-1.23922	1.61840	-0.77	0.4520	-0.15347	0.01976	0.02125	0.02340	0.02596	-4.59558	2.11715
HSEEK	HSEEK	1	0.94587	1.05525	0.90	0.3798	0.18420	0.03207	0.03523	0.03207	0.03523	-1.24259	3.13432

Covariance of Estimates					
Variable	Label	Intercept	EFREGUL	PLEARN	HSEEK
Intercept	Intercept	796.37056283	-20.54145781	-24.46846448	-8.387413216
EFREGUL	EFREGUL	-20.54145781	1.1149131436	0.0870640254	-0.252115692
PLEARN	PLEARN	-24.46846448	0.0870640254	2.619232651	-0.121789064
HSEEK	HSEEK	-8.387413216	-0.252115692	-0.121789064	1.1135527633

Correlation of Estimates					
Variable	Label	Intercept	EFREGUL	PLEARN	HSEEK
Intercept	Intercept	1.0000	-0.6894	-0.5357	-0.2817
EFREGUL	EFREGUL	-0.6894	1.0000	0.0509	-0.2263
PLEARN	PLEARN	-0.5357	0.0509	1.0000	-0.0713
HSEEK	HSEEK	-0.2817	-0.2263	-0.0713	1.0000

Collinearity Diagnostics						
Number	Eigenvalue	Condition Index	Proportion of Variation			
			Intercept	EFREGUL	PLEARN	HSEEK
1	3.74592	1.00000	0.00292	0.00443	0.00841	0.00946

Collinearity Diagnostics						
Number	Eigenvalue	Condition Index	Proportion of Variation			
			Intercept	EFREGUL	PLEARN	HSEE K
2	0.13555	5.25684	0.00162	0.00787	0.50528	0.48335
3	0.08982	6.45778	0.03899	0.31748	0.25593	0.49202
4	0.02871	11.42302	0.95647	0.67023	0.23038	0.01516

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Linear Regression Results

The REG Procedure

Model: Linear_Regression_Model

Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Forward Selection: Step 1

Variable OPEN Entered: R-Square = 0.2030 and C(p) = 1.6236

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	4435.69404	4435.69404	6.11	0.0209
Error	24	17413	725.53198		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	50.19125	29.73269	2067.49367	2.85	0.1043
OPEN	0.59489	0.24059	4435.69404	6.11	0.0209

Bounds on condition number: 1, 1

Forward Selection: Step 2

Variable CONSCIEN Entered: R-Square = 0.2866 and C(p) = 1.1469

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	6261.25128	3130.62564	4.62	0.0206
Error	23	15587	677.70479		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	10.26123	37.65171	50.33501	0.07	0.7876
OPEN	0.62934	0.23347	4924.27182	7.27	0.0129
CONSCIEN	0.30033	0.18299	1825.55724	2.69	0.1143

Bounds on condition number: 1.0082, 4.0326

Forward Selection: Step 3

Variable EXTRA Entered: R-Square = 0.3202 and C(p) = 2.1489

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	6996.86541	2332.28847	3.45	0.0339
Error	22	14852	675.07255		
Corrected Total	25	21848			

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	0.97068	38.61808	0.42650	0.00	0.9802
EXTRA	0.27996	0.26819	735.61413	1.09	0.3079
OPEN	0.46838	0.27942	1896.91710	2.81	0.1078
CONSCIEN	0.29253	0.18279	1729.02232	2.56	0.1238

Bounds on condition number: 1.4496, 11.693

No other variable met the 0.5000 significance level for entry into the model.

Summary of Forward Selection								
Step	Variable Entered	Label	Number Vars In	Partial R-Square	Model R-Square	C(p)	F Value	Pr > F
1	OPEN	OPEN	1	0.2030	0.2030	1.6236	6.11	0.0209
2	CONSCIEN	CONSCIEN	2	0.0836	0.2866	1.1469	2.69	0.1143
3	EXTRA	EXTRA	3	0.0337	0.3202	2.1489	1.09	0.3079

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Linear Regression Results
The REG Procedure
Model: Linear_Regression_Model
Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	6996.86541	2332.28847	3.45	0.0339
Error	22	14852	675.07255		
Corrected Total	25	21848			

Root MSE	25.98216	R-Square	0.3202
Dependent Mean	122.53846	Adj R-Sq	0.2276
Coeff Var	21.20327		

Parameter Estimates													
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate	Squared Semi-partial Corr Type I	Squared Partial Corr Type I	Squared Semi-partial Corr Type II	Squared Partial Corr Type II	95% Confidence Limits	
Intercept	Intercept	1	0.97068	38.61808	0.03	0.9802	0	.	.	.	.	-79.11831	81.05967
EXTRA	EXTRA	1	0.27996	0.26819	1.04	0.3079	0.22005	0.16901	0.16901	0.03367	0.04719	-0.27624	0.83616
OPEN	OPEN	1	0.46838	0.27942	1.68	0.1078	0.35476	0.07210	0.08676	0.08682	0.11326	-0.11109	1.04786
CONSCIEN	CONSCIEN	1	0.29253	0.18279	1.60	0.1238	0.28269	0.07914	0.10428	0.07914	0.10428	-0.08655	0.67160

Covariance of Estimates					
Variable	Label	Intercept	EXTRA	OPEN	CONSCIEN
Intercept	Intercept	1491.3558799	-2.38693194	-5.686480726	-4.368095538
EXTRA	EXTRA	-2.38693194	0.0719277462	-0.041353726	-0.002004965
OPEN	OPEN	-5.686480726	-0.041353726	0.0780733445	0.004979426
CONSCIEN	CONSCIEN	-4.368095538	-0.002004965	0.004979426	0.0334108844

Correlation of Estimates					
Variable	Label	Intercept	EXTRA	OPEN	CONSCIEN
Intercept	Intercept	1.0000	-0.2305	-0.5270	-0.6188
EXTRA	EXTRA	-0.2305	1.0000	-0.5518	-0.0409
OPEN	OPEN	-0.5270	-0.5518	1.0000	0.0975
CONSCIEN	CONSCIEN	-0.6188	-0.0409	0.0975	1.0000

Collinearity Diagnostics						
Number	Eigenvalue	Condition Index	Proportion of Variation			
			Intercept	EXTRA	OPEN	CONSCIEN
1	3.91182	1.00000	0.00113	0.00195	0.00140	0.00327
2	0.05749	8.24903	0.00049423	0.10882	0.05571	0.58431
3	0.01891	14.38310	0.17020	0.85917	0.27962	0.10786
4	0.01178	18.22107	0.82818	0.03006	0.66327	0.30456

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Linear Regression Results

The REG Procedure
 Model: Linear_Regression_Model
 Dependent Variable: PERFORM PERFORM

Number of Observations Read	69
Number of Observations Used	26
Number of Observations with Missing Values	43

Analysis of Variance					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	20	17474	873.71356	1.00	0.5577
Error	5	4374.19037	874.83807		
Corrected Total	25	21848			

Root MSE	29.57766	R-Square	0.7998
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Dependent Mean	122.53846	Adj R-Sq	-0.0010
Coeff Var	24.13745		

Parameter Estimates							
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t	Standardized Estimate
Intercept	Intercept	1	20.19861	177.67795	0.11	0.9139	0
INTR	INTR	1	0.40284	4.61995	0.09	0.9339	0.07677
EXTR	EXTR	1	2.21693	2.31226	0.96	0.3817	0.35210
TASK	TASK	1	4.74149	4.05010	1.17	0.2945	0.77379
SEFFIC	SEFFIC	1	-1.53017	4.03040	-0.38	0.7198	-0.45129
CLEARN	CLEARN	1	-6.14363	5.49024	-1.12	0.3140	-0.96850
TANXIE	TANXIE	1	1.02337	1.47137	0.70	0.5177	0.32102
REHERS	REHERS	1	-1.73870	2.67191	-0.65	0.5439	-0.27312
ELAB	ELAB	1	-0.06701	3.71881	-0.02	0.9863	-0.01467
ORG	ORG	1	-2.84394	1.66917	-1.70	0.1491	-0.51876
CTHINK	CTHINK	1	0.88374	3.48496	0.25	0.8099	0.23635
REGUL	REGUL	1	1.05765	1.21481	0.87	0.4238	0.43589
TSENV	TSENV	1	0.17785	3.39349	0.05	0.9602	0.04304
EFREGUL	EFREGUL	1	-1.80876	3.99830	-0.45	0.6699	-0.35159
PLEARN	PLEARN	1	-3.83848	4.17665	-0.92	0.4002	-0.47539
HSEEK	HSEEK	1	3.12686	3.12425	1.00	0.3629	0.60894
NEURO	NEURO	1	-0.24464	0.82448	-0.30	0.7786	-0.23378
EXTRA	EXTRA	1	0.47440	1.02171	0.46	0.6619	0.37289
OPEN	OPEN	1	0.31148	0.89004	0.35	0.7406	0.23592
AGREEAB	AGREEAB	1	-0.17578	0.71646	-0.25	0.8159	-0.12750
CONSCIEN	CONSCIEN	1	0.53951	1.22216	0.44	0.6773	0.52137

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