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Investigating the personality construct of self-control
as defined in the General Theory of Crime.

A thesis presented in partial fulfillment of the requirements for the degree of

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“He is gregarious and affectionate, but has a recurrent pattern of risk-taking behaviours. Look, for example, at his impulsive sampling of unknown substances (honey, haycorns and even thistles) with no knowledge of the potential outcome of his experimentation. We find him climbing tall trees and acting in a way that can only be described as socially intrusive.”

- An analysis of Tigger ¹

¹ Shea, S., Gordon, K., Hawkins, A., Kawchuk, J., & Smith, D. (2000). Pathology in the Hundred Acre Wood: a Neurodevelopmental Perspective on A.A. Milne. *Canadian Medical Association Journal*, 163, 1557 – 1559.

Abstract

Over the decades, “self-control” has generated much theoretical debate and research across the disciplines of human science. Although intuitively understood, the concept of self-control remains slippery as it can be viewed from various perspectives. As a consequence, it has been defined and measured in different ways which are not all consistent with one another. Self-control, or the lack thereof, has been implicated in criminality, psychopathology and various deviant behaviours. The General Theory of Crime (Gottfredson & Hirschi, 1990) has attracted much interest and continues to be a major influence in understanding crime and deviance. At the core of this theory is the construct of self-control. Although the authors argue that their theory denies the existence of “an enduring criminal disposition”, their definition of self-control appears fully compatible with the concept of “trait” as used in personality psychology. However, there have been few attempts to establish explicit connections between personality traits and the self-control construct as defined in the General Theory of Crime.

This research investigated the personality construct of self-control as defined in The General Theory of Crime. The sample consisted of 63 faculty staff members and 126 young students located at the Albany, Palmerston North and Wellington campuses of Massey University. Quantitative data were collected via a postal survey questionnaire comprising scales measuring individual differences relating to (a) personality (Francis, Brown & Philipchalk (1992) Abbreviated form of the Revised Eysenck Personality Questionnaire), (b) self-control (Grasmick, Tittle, Bursik & Arneklev (1993) Self-Control Scale), (c) imprudent behaviours (an adaptation of Marcus (2003) Retrospective Behavioural Scale), and (d) impulsivity (Dickman (1990) Functional and Dysfunctional Impulsivity Inventory). Results from the present study indicated that incorporating personality variables into a model of self-control explained more of the variance, strengthened the prediction of imprudent behaviours and indicated better goodness –of-fit statistics. Furthermore, the components of self-control, as defined in the general theory of crime, were better explained by the conceptually distinct latent constructs of Dysfunctional and Functional impulsivity. Limitations of this research and recommendations for further research are considered.

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TABLE OF CONTENTS

	Page
Abstract	iii
Acknowledgements	iv
Table of contents	v
List of Tables	x
List of Figures	xi
Introduction	1
Issues in the conceptualisation of self-control	4
Understanding self-control	4
The influence of competing theoretical paradigms	5
Gottfredson and Hirschi's theory of self-control	7
A psychological perspective	8
Toward a better understanding	9
Summary	10
Literature and research review	12
Gottfredson and Hirschi's General Theory of Crime (GTC)	12
On crime and analogous behaviours	12
On criminality	14
On opportunity	18
Summary	20
Wrestling with self-control	21
The problem of measurement	21
Empirical measurement of GTC self-control	23

Self-control in the Psychological tradition	26	26
The problem of definition and measurement	26	26
Insights from personality theory	29	29
Eysenck's theory of personality	32	32
Impulsivity as an important correlate of crime	36	36
Crime and personality	38	38
Toward conceptual clarification of self-control	39	39
Aim and general hypothesis		41
Method		44
Participants and Setting	44	44
Setting of the study	44	44
Population sample	44	44
Sample characteristics	45	45
Measures	47	47
Self-administered questionnaire	47	47
Demographic information	47	47
Personality	48	48
Self-control	51	51
Imprudent behaviour	52	52
Impulsivity	54	54
Procedure	57	57
Ethics approval	57	57
Pilot study	57	57
Obtaining participants	57	57
<i>Students</i>	58	58
<i>Faculty staff</i>	59	59

Analyses	60
Statistical analyses using SPSS-11	60
Statistical analyses using AMOS 4.01	60
Results	62
Data Entry	62
Missing Data	62
Data Screening	63
Assumption Testing	64
Internal consistency reliability analyses	64
Personality scale (EPQR-A)	66
Grasmick self-control scale (GRAS)	67
Imprudent behaviour scale (RBS)	68
Dickman's Impulsivity Inventory (DII)	69
Comparative analyses of groups	69
Age groups	69
Gender groups	70
Correlation analyses	71
Factor Analyses	75
Exploratory factor analyses (EFA)	75
<i>EPQR-A</i>	77
<i>GRAS</i>	78
<i>RBS</i>	80
<i>DII</i>	80

Confirmatory factor analyses (CFA)	81
<i>EPQR-A</i>	83
<i>GRAS</i>	85
<i>RBS</i>	86
<i>DII</i>	87
Structural Equation Modeling	89
Conceptual Model	89
Measurement Model	91
<i>EPQR-A</i>	93
<i>GRAS</i>	94
<i>RBS</i>	96
<i>DII</i>	97
Structural Model	98
<i>Hypothesised Model (Model 1)</i>	98
<i>Respecified Model (Model 2)</i>	99
<i>Parsimonious Model (Model 3)</i>	100
<i>Alternative Models</i>	103
<i>Interpretation of estimates</i>	104
Discussion	105
Aim and purpose of the present study	105
Expected relationships	106
Findings based on the data in the present study	107
Present findings in light of previous research	109
The personality construct of self-control	111
Evaluation of shortcomings and implications for future research	112

Conclusion		114
Conclusions	114	
Contributions to knowledge	115	
Future directions	115	
References		116
Appendices		131
List of Appendices		131
Appendix A: Information Sheet	132	
Appendix B: Demographic information survey	133	
Appendix C: Personality Measure (EPQR-A)	134	
Appendix D: Self-control Measure (GRAS)	135	
Appendix E: Imprudent Behaviour Measure (RBS)	136	
Appendix F: Impulsivity Measure (DII)	137	
Appendix G: Correlations between the components of self-control and all other variables	138	
Appendix H: Structural Model with indicator variables	139	
Appendix I: Model 1, Hypothesised Model	140	
Appendix J: Model 2, Respecified Model	141	
Appendix K: Model 4, Alternative Independence Model	142	
Appendix L: Model 5, Alternative Impulsivity Model	143	

List of Tables

	Page
Table 1. <i>Participant Demographic Characteristics</i>	46
Table 2. <i>Summary of Measures</i>	48
Table 3. <i>Cronbach's alpha coefficient, Mean and score range for all measures</i>	65
Table 4. <i>Inter-item correlation values</i>	66
Table 5. <i>Comparison of scores for Age groups</i>	70
Table 6. <i>Comparison of scores for Gender groups</i>	71
Table 7. <i>Correlations between measures</i>	73
Table 8. <i>Matrix for a forced four-factor solution of the EPQR-A</i>	78
Table 9. <i>Matrix for a forced six-factor solution of the GRAS</i>	79
Table 10. <i>Matrix for a forced eight-factor solution of the RBS</i>	80
Table 11. <i>Matrix for a forced two-factor solution of the DII</i>	81
Table 12. <i>Description of fit indices</i>	82
Table 13. <i>Obtained fit statistics for CFA models</i>	83
Table 14. <i>Obtained fit statistics for the measurement models</i>	94
Table 15. <i>Obtained fit statistics for the structural models</i>	100
Table 16. <i>Comparison of fit statistics for alternative models</i>	101

List of Figures

	Page
<i>Figure 1.</i> A conceptual model of low self-control as defined in GTC	21
<i>Figure 2.</i> A conceptual model of Eysenck's theory of Personality and Impulsivity	34
<i>Figure 3.</i> 24-Item model of factorial structure of the EPQR-A	84
<i>Figure 4.</i> 24-Item model of factorial structure of the GRAS	86
<i>Figure 5.</i> Behaviour category model of the RBS	87
<i>Figure 6.</i> 23-Item model of factorial structure of the DII	88
<i>Figure 7.</i> Conceptual model of the Personality construct of Self-control	89
<i>Figure 8.</i> Measurement model of the EPQR-A	93
<i>Figure 9.</i> Measurement model of the GRAS	95
<i>Figure 10.</i> Measurement model of the RBS	96
<i>Figure 11.</i> Measurement model of the DII	97
<i>Figure 12.</i> Model 3, Parsimonious and Final model	102

Introduction

Since its formulation over a decade ago, Gottfredson and Hirschi's (1990) General Theory of Crime (GTC) continues to stimulate theoretical debate and research. In particular, re-focussing attention on understanding why some individuals engage in criminal and analogous acts whilst others, in similar situations, do not. The core concept of GTC is "self-control", postulated to be the essential barrier between an individual engaging in criminal, or analogous, behaviour or refraining from such. According to GTC, ineffective parenting practices result in low self-control, which, in interaction with situational opportunities, results in criminal or deviant acts. As such, levels of self-control are determined at a young age and remain relatively stable throughout life. Gottfredson and Hirschi contend that, the identification of individuals low in self-control is possible by studying other non-criminal, analogous, behaviours with long-term adverse consequences, however the measurement of self-control remains contentious.

Gottfredson and Hirschi argue that their theory denies the existence of "an enduring criminal disposition", yet their definition of self-control appears fully compatible with the concept of "trait" as used in personality psychology. In psychology, personality trait is defined as a predisposition to respond in a particular way to certain situations, objects or persons (Aiken, 1999). Controlling these responses entails a consideration of the long-term personal and social consequences of behaviour for oneself and others, the self-control of immediate reactions and impulses. Furthermore, GTC and trait theory both conceptualise self-control as being stable over time and generalised across situations.

Self-control is an important facet of personality. Although various psychological theories implicate self-control, or the lack thereof, in criminality, psychopathology and deviant behaviours, there is little consensus regarding the exact definition and measurement of the concept. However, most omnibus or multi-trait personality inventories include a measure of self-control in one form or another. For example, the California Psychology Inventory (Gough, 1975); the Eysenck Personality Questionnaires (Eysenck & Eysenck, 1975); the Minnesota Multiphasic Personality

Inventory (Hathaway, & McKinley, 1940); the Multidimensional Personality Questionnaire (Tellegen, 1982); the NEO Personality Inventory (Costa & McCrae, 1992); and the Sixteen Personality Factor Questionnaire (Cattell & Eber, 1962).

Support for self-control as an important variable in the prediction of crime has come from investigations of GTC. However, to date there have been few attempts to establish explicit connections between the self-control construct as defined in GTC and personality traits. The hypothesis that the meaning of self-control could better be reconceptualised as a composite of personality traits guides the present investigation. These understandings from a personality psychology paradigm would modestly contribute to the growing literature on Gottfredson and Hirschi's influential theory.

Linking criminal and analogous behaviours to a validated and established personality structure could help to organise and interpret research findings about the development of such behaviours. Furthermore, the integration of knowledge from different disciplines may contribute to the clarification of self-control, its nomological net, measurement and aetiology. Crime and imprudent behaviours lead to ever increasing social and personal distress, thus theoretical integration may contribute to prevention and rehabilitation through improved measurement and assessment. In particular, emergent patterns of personality dimensions in relation to levels of self-control may reveal better understandings of why some people are more vulnerable than others are to engaging in behaviour with long-term aversive consequences.

To summarise, Gottfredson and Hirschi's general theory continues to influence criminological theory and research. At the core of GTC is self-control, posited as the essential element to explain all crime, and analogous behaviours, in all societies. Although Gottfredson and Hirschi deny that self-control is a personality trait as understood in personality psychology, GTC describes characteristics, or traits, that account for differences in criminality at the individual level. Furthermore, self-control is conceptualised as general across situations and stable over time, a latent construct that underlies criminal and analogous behaviour. Thus, it appears that well-established psychological concepts and understandings from personality trait theory would complement GTC, clarifying the conceptualisation and measurement of self-control.

In the following chapter, “Issues in the conceptualisation of self-control”, various differing schools of thought and relevant issues in conceptualising self-control are overviewed. These issues are then developed and explored through a review of the literature and research in chapter three, “Literature and research review”. First, there is an exploration and discussion of the elements of self-control as defined in GTC. Secondly, the problems of conceptualisation and measurement of self-control are unfolded. Thirdly, self-control is identified as an important characteristic of personality and relevant psychological theories are reviewed. Additionally, impulsivity is explored as a specific personality trait that appears to have a well-established relationship with criminal and imprudent behaviours. Finally, elements from both GTC and personality theory are woven together as an attempt clarify conceptualisation and measurement of self-control. This conceptual clarification guides the research and informs the discussion of obtained results and the conclusion in the final chapters, “Aim and general hypothesis, Method, Results, Discussion, and Conclusion.”

Issues in the conceptualisation of self-control

Understanding self-control

Self-control, or the lack thereof, has fuelled much controversy and exploration across various disciplines interested in understanding human and social behaviour (e.g., Ainsworth, 2000; Bandura, 1997; Bartol, 2002; Carver & Scheier, 1981; Eysenck, 1977; Putwain & Sammons, 2002; Webster & Jackson, 1997). In some respects, self-control seems to be self-defining and intuitively understood yet the meaning is subtle and therefore presents problems when trying to specify exactly what it is. The concept is generally understood as an act of denying oneself and controlling impulses and behaviour; “the ability to exercise restraint or control over one’s feelings, emotions and reactions” (Collins Shorter English Dictionary, 1995). A broad conceptualisation of self-control thus includes not only cognitive and affective processes but also directly observable behaviour in an active model of man in his environment.

However, self-control can be viewed from various theoretical paradigms and has been defined and measured in different ways with little consensus. As such, the concept of self-control suffers the “jingle-jangle fallacy” (Block, 1995, p. 210); the same label is used with quite different meaning while different labels essentially mean the same. In the science of psychology, Aikin’s “jingle fallacy” (Block, 1995, p. 209) suggests agreements between constructs that do not exist while Kelley’s “jangle fallacy” (cited in Block, 1995, p. 209) involves conceptual redundancies that lead to the reinvention of constructs under new labels. Taken together, these errors hinder the development of cumulative knowledge by preventing the recognition of correspondences across theoretical disciplines.

There is a long history, and copious literature, that implicates self-control in anti-social, criminal and deviant behaviour (e.g., Ainslie, 1999; Andrews & Bonta, 1998; Blackburn, 1994; Eysenck, 1977; Eysenck & Gudjonsson, 1989; Fishbein, 2000; Gottfredson & Hirschi, 1990; Miethé & McCorkle, 2001; Putwain & Sammons, 2002; Sheley, 1995), and in various forms of psychological and behavioural distress (e.g., American Psychiatric Association, 1994; Bandura, 1997; Boekarts, Pintrich & Zeidner, 2000; Carver & Scheier, 1981; Forgas, 2001; Friedman & Lackey, 1991; Jonas, 1973;

Kaplan & Sadock, 1988; Webster & Jackson, 1997). The medical and psychological quest to identify troublesome people and to explain and predict their behaviour has entangled self-control with different attributes and traits compiled over the years (Menzies, 1997). Although the consequences of self-control are not always positive (Caci, Nadalet, Bayle, Robert & Boyer, 2003; Dickman, 1990), low self-control and/ or impulsivity have become categories used to account for criminal, violent or otherwise bothersome behaviour (Andrews & Bonta, 1998; Blackburn, 1994; Eysenck, 1977; Webster & Jackson, 1997). The literature supports a strong association between low self-control and criminality; however, an increased understanding of the nature and reasons for this association depends on advancement in the conceptualisation and measurement of self-control (Fishbein, 2000; Marcus, 2003; Webster & Jackson, 1997).

The influence of competing theoretical paradigms

Traditionally, sociological theory has dominated mainstream criminology, seeking to identify causes of crime in social structures and cultural factors (Ainsworth, 2000; Akers & Jensen, 2003; Bartol, 2002; Blackburn, 1994). Sociological criminology proclaimed crime to be social and social class became the single most important variable in criminological theorising (Ainsworth, 2000; Andrews & Bonta, 1998; Blackburn, 1994). In the 1920s, sociology had captured the field of criminology and individual variables as the cause of crime were trivialised. However, empirical support for personality correlates of criminality continued to emerge (Andrews & Bonta, 1998; Hollin, 1989). However, robust evidence supporting personality as a correlate of crime was consistently discounted and denied whilst, despite the limited empirical support, sociological variables were promoted (Ainsworth, 2000; Andrews & Bonta, 1998; Bartol, 2002; Blackburn, 1994).

The wrestle with self-control is evident through the ages and across the various philosophical and psychological schools of thought. The classical Greek philosophers first explored why people do not, and should not, follow their spontaneous inclinations. Since Aristotle's introduction of *akrasia*, "weakness of will", a lot has been theorised and debated about the will but, although self-control has received much attention, not many new ideas have emerged over the years (Aiken, 1999; Ainslie, 2001; Bandura, 1997; Barone, Hersen, & Van Hasselt, 1998; Forgas, 2001; Webster & Jackson, 1997). The early philosopher's struggle with self-control is evident in the literature. For

example, Dante suggested that the incontinent man allowed desire to pull reason from her throne (Davidson, 1980). And Mill (as cited in Davidson, 1980, p.30) offered, “Men often, from infirmity of character, make their election for the nearer good, though they know it to be the less valuable; and this no less when the choice is between two bodily pleasures than when it is between bodily and mental...pursue sensual indulgence to injury of health, though aware that health is the greater good.”

In the psychological tradition, the strongest covariate of crime is personality while, from a sociological paradigm it is social class (Andrews & Bonta, 1998). Psychological theories assert that criminality manifests in behaviour through psychological processes at the individual level (Blackburn, 1994; Cassel & Bernstein, 2001; Eysenck & Gudjonsson, 1989; Fishbein, 2000). Following a psychodynamic theme, control theories have focussed on why people do not commit crime, explaining how people come to develop strong ties to convention and resist temptations (Ainsworth, 2000; Andrews & Bonta, 1998). While sociological theories assume that humans are essentially conforming and pressured into deviance by societal influences, control theories focus on the “original sin” and the development of restraints and inhibitions against deviance (Ainsworth, 2000; Andrews & Bonta, 1998; Bartol, 2002; Blackburn, 1994). As a socialisation theory, control theories explain criminality as the expression of primitive impulses for which effective controls have not yet been developed (Andrews & Bonta, 1998).

However, social cognitive theory rejects a dualistic view of the relationship between social structure and personal agency. Adopting a transactional position, they assert that people are producers and products of social environments (Akers & Jensen, 2003; Bandura, 1997; Putwain & Sammons, 2002). As such, an act is a function of the interaction between a person and a situation; conditions and opportunities are necessary but only the person has the power to produce action. However, when a person acts on some tendency, the situation is merely the occasion for its expression and not the cause (Ajzen, 1988; Blackburn, 1994; Cassel & Bernstein, 2001; Putwain & Sammons, 2002). Furthermore, behaviour is often used to mean an *act* or a *tendency*, when different kinds of explanations are required in each instance (Ainsworth, 2000; Bartol, 2002; Blackburn, 1994).

Gottfredson and Hirschi's theory of self-control

Defined as the degree to which an individual is tempted by the immediate gratification of the moment without considering the long-term consequences, self-control is the core concept of Gottfredson & Hirschi's (1990) "General Theory of Crime" (GTC). The authors clarify the concept of self-control by stressing, "we see self-control as the barrier that stands between the actor and the obvious momentary benefits crime provides" (Hirschi & Gottfredson, 1993, p. 53). Hence, GTC is a socialisation control theory and self-control is "the tendency to avoid acts whose long-term costs exceed their momentary advantages" (Hirschi & Gottfredson, 1994, p. 3). Subscribing to the classical hedonistic conception of human nature, Gottfredson and Hirschi view criminals, like everyone else, as pursuing pleasure and avoiding pain. However, unlike most other people, criminals lack a concern for the long-term adversity that outweighs the short-term pleasures inherent in crime (Gottfredson & Hirschi, 1990; Marcus, 2003). The suggestion is that those possessing high self-control will be less vulnerable, at all stages of life, to the temptations of immediate pleasure that criminal and analogous acts offer (Gottfredson & Hirschi, 1990). Thus, self-control is "the calculation of the consequences of one's acts" (Gottfredson & Hirschi, 1990, p. 95). Gottfredson and Hirschi further contend that once established, around the age of eight, self-control remains relatively stable throughout life (Pratt & Cullen, 2000; Turner & Piquero, 2002).

Gottfredson and Hirschi (1990) draw on previous research to posit ineffective parenting as the primary cause of low self-control. Much parental action is geared toward teaching children to suppress impulsive behaviour, consider long-term consequences and constrain their behaviour by considering the rights and feelings of others. Ineffective parenting practices produce low self-control, which interacts with situational opportunities to result in criminal acts and analogous behavior. As such, parental supervision is proposed as the direct link between social control and self-control, and individual differences in self-control are primarily attributed to family socialisation practices. However, Gottfredson and Hirschi do not regard individuals as only creatures of learning or products of positive forces, specific defects or particular pressures. Rather, individual differences are thought to mediate the effects of effective socialisation.

In summary, Gottfredson and Hirschi (1990) propose self-control as the single variable necessary to explain all criminal and analogous acts, behaviour with long-term negative consequences for the actor. Self-control is defined in GTC as a unidimensional latent “trait” present in everyone, with individual differences varying along a continuum from high to low. Once formed at an early age, due to parenting practices, levels of self-control remain stable throughout life and are manifest in crime and analogous behaviours.

A psychological perspective

Gottfredson and Hirschi’s (1990) self-control theory remains influential in understanding criminal and imprudent behaviour and continues to receive much research interest (e.g. Andrews & Bonta, 1998; Bartol, 2002; Burton, Evans, Cullen, Olivares, & Dunaway, 1999; Paternoster & Brame, 2000; Pratt & Cullen, 2000). However, Andrews and Bonta (1998) query whether the central concept of GTC, low self-control, is actually a newly discovered propensity because it appears to combine some of the best, empirically established, psychological correlates of criminal behaviour. Studies that focus on individual criminal conduct have yielded robust information of individual characteristics. Among the strongest and most consistent correlates of criminality are antisocial personality, psychopathic personality and weak self-control (Andrews & Bonta, 1998).

Also called into question is the unidimensionality of Gottfredson and Hirschi’s (1990) self-control (e.g., Arneklev, Grasmick & Bursik, 1999; Flora, Finkel & Foshee, 2003; Grasmick, Tittle, Bursik & Arneklev, 1993) and the perspective of a single process influencing criminal and related behaviour (e.g., Burton et al., 1999; Longshore & Turner, 1998). However, advocates for GTC have often dismissed negative findings as an inadequate operationalisation of the theory’s key variables and main hypotheses (Grasmick et al., 1993; Hirschi & Gottfredson, 1993; Marcus, 2003; Pratt & Cullen, 2000). The strongest support for GTC comes from Pratt and Cullen (2000) who, in a meta-analysis of 21 empirical studies, consistently found an effect size exceeding .20 for self-control. Thus, the core proposition of GTC, self-control, has received empirical support and low self-control ranks amongst the strongest known correlates of crime.

Gottfredson and Hirschi (1990) propose that, at the individual level, self-control discriminates offenders from non-offenders, “people who do not develop strong self-control are more likely to commit criminal acts, whatever the other dimensions of their personality” (p.111). As such, the personality theorist’s idea of a particular personality type specifically predisposing individuals to crime is rejected (Gibbs, Giever & Martin, 1998; Gottfredson and Hirschi, 1990). Furthermore, Hirschi and Gottfredson (1993) claim that their theory cannot be integrated with another taking the opposite point of view.

However, despite Gottfredson and Hirschi’s protests, the few investigations of the GTC construct of self-control in terms of personality psychology do suggest an overlap with well-known personality constructs (O’Gorman & Baxter, 2002; Romero, Gomez-Fraguela, Luengo, & Sobral, 2003; see also Arneklev, Grasmick & Bursik, Jr., 1999; Gibbs et al., 1998; Marcus, 2004). Furthermore, Gottfredson and Hirschi (1990) identify “an enduring tendency [that] is well within the meaning of ‘personality trait’” (p.109) and describe the offender in terms of personality traits (Marcus, 2004). Similarly, personality theory characterises individuals in terms of propensity traits that result in an inclination to certain behaviour. Personality theory does not characterise individuals in terms of deterministic traits in which human action is determined by external forces acting on the will. Additionally, GTC contends that the level of self-control and the particular situations an individual experiences will mediate the extent to which their basic disposition influences their behaviour (Gibbs et al., 1998; Gottfredson & Hirschi, 1990). Thus, self-control, defined as a stable tendency underlying consistent patterns of behaviour, distinguishes individuals. This appears compatible with the personality concept of trait. Furthermore, the authors of GTC themselves use the term *trait* to refer to self-control and the literature exploring GTC frequently refers to self-control as a characteristic of personality (Grasmick et al., 1993; Marcus, 2003; O’Gorman & Baxter, 2002; Romero et al., 2003).

Toward a better understanding

As defined in GTC, low self-control is not a rare defect found in a small group of sociopaths but rather “a continuously distributed personality trait possessed by everybody to a different extent” (Marcus, 2004, p. 46) and manifested in a variety of behaviours, not only criminal acts (Gottfredson & Hirschi, 1990). This is fully

compatible with personality psychology where behaviours are regarded as valid manifestations of latent personality constructs (Aiken, 1999; Ajzen, 1988; Barone et al., 1998; Gibbs et al., 1998). Furthermore, central to GTC are the concepts of stability and versatility in offending explaining behavioural consistency over time and variability across behaviours (Gibbs et al., 1998). Thus, self-control is understood as a stable underlying tendency that is manifest in a wide variety of criminal and non-criminal behaviours. Similarly, personality traits are conceptualised as stable and general characteristics that predispose individuals to behave in certain ways in certain situations.

Hans Eysenck remains one of the few psychologists who have attempted to formulate a general, universal theory of criminal behaviour (Bartol, 2002; Eysenck & Gudjonsson, 1989). Eysenck (1967, 1977) posited criminal behaviour as the result of an interaction between different personality dimensions and certain environmental conditions. Eysenck's theory combines environmental, neurobiological and personality factors to understand behaviour. Different combinations of environmental, neurobiological and personality factors result in different types of behaviour, and different personality types are more susceptible to certain crimes as opposed to others (Bartol, 2002; Eysenck, 1977; Romero et al., 2003).

Gottfredson and Hirschi (1990) criticise such a position as offering little hope for prevention or rehabilitation. Eysenck (1977) however asserts that neither crime nor criminality is innate. The emphasis is on certain peculiarities of the central and autonomic nervous systems that react with the environment, upbringing and many other environmental factors to increase the probability that an individual will engage in antisocial behaviour (Eysenck, 1977; Eysenck & Gudjonsson, 1989; Bartol, 2002). Thus, contributions from personality psychology may contribute to the clarification of GTC self-control and its nomological net and, in general, theoretical integration could benefit criminological theories of individual differences (Romero et al., 2003).

Summary

Sociological and psychological traditions have a long and contemptuous relationship in criminological theory, respectively focussing on social causes or individual differences as covariates of crime. Gottfredson and Hirschi's (1990) theory of self-control falls within the realm of psychological theories because it explains

differences in criminality at the individual level. However, the core concept of GTC, self-control, is poorly conceptualised and therefore researchers have struggled to operationalise it into a measurable concept. Despite the measurement difficulties and conceptual ambiguities, an impressive amount of literature supports self-control as a strong correlate of criminal behaviour. Self-control is also an important factor in personality psychology and constructs and themes in GTC appear compatible with psychological theories of personality.

Literature and Research Review

Gottfredson and Hirschi's General Theory of Crime (GTC)

On crime and analogous behaviours

Gottfredson and Hirschi (1990) contend that the central concept of any theory of crime must be crime itself. Subsequently GTC begins with a statement of the nature of crime and then deduces the characteristics of people most likely to engage in crime and analogous behaviour. Although the media feed on bizarre and unusual crimes, most crimes are mundane and trivial, requiring little preparation, and often not resulting in large gains for the offender (Fishbein, 2000; Gottfredson & Hirschi, 1990; Greenwood & Turner, 1987; Spier, 2002). Generally, criminal and analogous acts provide immediate and easy gratification of desires, they are exciting, risky and thrilling, require little skill or planning, cause others harm and provide very few long-term benefits (Andrews & Bonta, 1998; Gottfredson & Hirschi, 1990).

The very definition of crime is however a volatile social construct that changes according to the prevailing political, economic and social conditions in a society (Andrews & Bonta, 1998; Miethe & McCorkle, 2001). Traditionally, criminal behaviour refers to actions that are either, (1) prohibited by the government, and punishable under the law; (2) a violation of religious and moral norms, punishable by supreme spiritual beings; (3) a violation of customary and traditional norms, punishable by the community; or (4) antisocial, rewarding the offender at a cost to others (Andrews & Bonta, 1998). However, Gottfredson and Hirschi (1990) do not define crime in legalistic or strictly behavioural terms but assert that their theory accounts for the majority of acts defined as criminal in all societies. Furthermore, their definition of crime is itself derived from a general conception of human nature. Therefore, as a general theory, GTC is not bound to historical or cultural periods but is considered sufficient to explain all acts of crime and analogous behaviour in all societies (Grasmick et al., 1993).

GTC is postulated as applicable to all crime, formally defined as “acts of force or fraud undertaken in pursuit of self-interest[ed pleasure]” (Gottfredson & Hirschi, 1990, p.15). Such acts of force and fraud mirror the traditional definitions of crime that

distinguish between violent personal crimes and property crimes. Examples of acts of force are homicide and rape and acts of fraud are burglary, robbery, auto theft and white-collar crime (Wilcox, Land and Hunt, 2003). Considering whether all crime is equal, Forgas (2001) points out that the hedonistic principle of avoiding pain and approaching pleasure appears to operate differently when serving the fundamentally different survival needs of security (protection) versus nurturance (nourishment). In addition, systematic evidence from environmental research indicates that certain environments and situations elicit certain classes of behaviour as appropriate to the setting (Carver & Scheier, 1981). This would suggest that acts of “force and fraud reflect overlapping, but empirically distinct, constructs” (Rebellion and Waldman 2003, p. 327). However, Gottfredson and Hirschi (1990) contend that because low self-control is the causal factor of both acts of force and acts of fraud, any distinction between the two bears no theoretical importance.

Furthermore, Gottfredson and Hirschi (1990) contend that low self-control underlies all criminal and analogous, non-criminal acts, behaviour with long-term aversive consequences. As such, individual tendencies to crime do not necessarily require crime for their satisfaction because the benefits of crime are also found in many non-criminal, analogous, acts like drinking alcohol, gambling, smoking, or quitting a job (Gottfredson & Hirschi, 1990). The strong, positive correlations among criminal and analogous acts supports this equivalency and the literature further suggests that *pleasures* tend to come together in clusters and do not substitute for one another (Gottfredson & Hirschi, 1990). Investigations of the acts that cluster with deviance and crime suggest that they are different manifestations of a common cause (Gottfredson & Hirschi, 1990; Marcus, 2003). Gottfredson and Hirschi point out that in all cases the behaviour produced immediate, short-term gratification with long-term, aversive consequences. As such, the common factor driving the choice of short-term benefits over long-term costs is low self-control (Gottfredson & Hirschi, 1990).

Throughout the literature, many social-level and individual-level correlates of crime are identified (e.g., Bartol, 2002; Blackburn, 1994; Cassel & Bernstein, 2001; Sheley, 1995). However, Gottfredson and Hirschi (1990) discuss social-level correlates of crime like peer-group, school involvement, job, marriage and family, in terms of individual-level differences. As such, the constraints of social institutions do not tend to

influence individuals with low self-control because they avoid involvement in, or attachment to, establishments like relationships, employment and school (Gottfredson & Hirschi, 1990). This implies that low self-control will not only manifest in criminal and analogous behaviours but will also show instability in education, employment and relationships (Gottfredson & Hirschi, 1990; Paternoster & Brame, 2000; Piquero & Tibbets, 1996). The GTC claim that low self-control will not only have an impact on crime but also on life quality, life chances and other social consequences has received empirical support (e.g., Evans, Cullen, Burton, Dunaway, & Benson, 1997; Paternoster & Brame, 2000; Piquero & Tibbets, 1996).

In summary, Gottfredson and Hirschi (1990) describe the nature of crime from which they deduce the characteristics of people most likely to engage in crime and analogous behaviour. Although the definition of crime is a volatile social construct, Gottfredson and Hirschi assert that their theory accounts for the majority of acts defined as criminal in all societies. GTC contends that low self-control underlies all acts of force and fraud undertaken in pursuit of pleasure and that the “benefits” of crime can be found in many non-criminal, analogous acts. Therefore, as a general theory, GTC is applicable to all acts of crime and analogous behaviour. Crime and analogous acts are considered the behavioural manifestation of low self-control and Gottfredson and Hirschi further extend their theory to account for social-level correlates of crime such as instability in education, employment and relationships.

On criminality

Gottfredson and Hirschi’s (1990) theory re-directs attention to why people do not commit crime. A conception of criminality, or low self-control, is at the very core of GTC. Following from their conception of crime, Gottfredson and Hirschi (1990) present low self-control as “the individual-level cause of crime” (p.232), which is defined as “the tendency of individuals to pursue short-term gratification without consideration of the long-term consequences of their acts” (p.177). These individuals are characterised as being impulsive and risk-taking, indifferent to the interests of others and undeterred by delayed punishment (Gottfredson and Hirschi, 1990). Thus understood, criminality is the absence of self-control that is required to produce a concern for the long-term consequences of one’s actions, whilst crime is an act in pursuit of self-interested pleasure (Gottfredson & Hirschi, 1990).

Gottfredson and Hirschi (1990) postulate low self-control to be the direct outcome of inappropriate child rearing practices. Levels of self-control are the outcome of parental ability to affectionately care for their children and monitor, recognise and effectively punish unacceptable behaviour (Akers & Jensen, 2003; Gottfredson & Hirschi, 1990). Andrews and Bonta (1998) agree that, “the family is the child’s first socialising agent” (p. 197) and, from a social learning perspective, that parents instil the values, norms and beliefs of society and family relationships promote an attachment to members of society. A large body of literature acknowledges the interrelation between parenting, or child-rearing practices, and delinquent or imprudent behaviour (e.g., Andrews & Bonta, 1998; Currie, 2003; Fishbein, 2000; Gibbs et al., 1998; Hollin, 1989; Loeber & Southamer-Loeber, 1986; Moffit, 1993; Murray, 2003; Wolman, 1999). Additionally, Coloroso (1995) asserts that ineffective practices like bribes and rewards result in the child performing actions for the pay-off, and threats or punishment rob a child of dignity and self-worth. In either case, the child feels that control is external and thus does not develop a sense of self-control. Longitudinal studies also support the contention that harsh discipline, physical punishment and emotional neglect lead to violence and delinquency (Andrews & Bonta, 1998). However, personality psychology emphasises that biological risks factors, mediated by neurophysiological underarousal, and a difficult temperament also play an important role in criminality and family dynamics (Ainsworth, 2000; Andrews & Bonta, 1998; Blackburn, 1994; Eysenck, 1977; Eysenck & Gudjonsson, 1989).

Gottfredson and Hirschi (1990) propose this stable criminal propensity, low self-control, to be a unidimensional latent factor combining six characteristics. Closely linked to their description of criminal acts, Gottfredson and Hirschi examine the characteristics of people who, given the opportunity, choose to become involved in criminal or analogous acts (Gibbs & Giever, 1995; Grasmick et al., 1993). As such, Gottfredson and Hirschi (1990) characterise those lacking in self-control as tending to be impulsive, prefer “simple gratification of desires” (p.89), adventurous and risk seeking, prefer physical activities, insensitive and self-centred, and have a volatile temper. Not only are individuals with low self-control more likely to engage in criminal and self-destructive behaviour but they are also more likely to be unsuccessful in marriage, school and work (Grasmick et al., 1993). Additionally, a large body of literature links high self-control with a variety of positive personal, interpersonal and

societal outcomes (Flora et al., 2003). Gottfredson and Hirschi (1990) summarise self-control as follows

Since these traits can be identified prior to the age of responsibility for crime, since there is considerable tendency for these traits to come together in the same people, and since the traits tend to persist through life, it seems reasonable to consider them as comprising a stable construct useful in the explanation of crime. (p. 90).

Gottfredson and Hirschi (1990) adopt an invariant view of the age and crime relationship, asserting that age is not useful in explaining crime (Wilcox, Land & Hunt, 2003). GTC proposes that, once established around the age of 8 to 10 years-old, self-control remains relatively stable throughout life (Gottfredson & Hirschi, 1990). A persistent observation in the literature is that although the numbers may change, the pattern of age distribution for crime has persisted over many years of investigation. Crime rates peak in adolescence to early adulthood and show a sharp and gradual decline thereafter (Burton et al., 1999; Gottfredson & Hirschi, 1990; Moffit, 1993; Pratt & Cullen, 2000; Turner & Piquero, 2002). However, Burton et al. (1999) found that for two distinct adult age groups, 18 through 30 and 31 through 50, self-control had a significant relationship with both criminal and analogous acts. Discounting alternative explanations such as strengthened social bonds or changed social situations, Gottfredson and Hirschi contend that changes in an individual's behavior that comes with age, *maturational reform*, account for why most delinquents do not become adult criminals. However, the stability postulate does not mean that once established the absolute level of self-control remains fixed and stable within an individual, but rather that, relative to the broader population, the individual level of self-control remains relatively stable. Thus, the relationship between age and self-control is considered constant, despite individuals committing less crime as they age.

According to GTC, opportunities for crime also change with age and context (Arneklev et al., 1999; Gottfredson & Hirschi, 1990). Thus understood, differences in offending rates are the outcome of an interaction between the individual's predisposition to crime and opportunity differences for criminal behaviour (Arneklev et al., 1999; Gottfredson & Hirschi, 1990; Marcus, 2003; Moffit, 1993; Turner & Piquero, 2002). Furthermore, based on a review of theories of population heterogeneity and theories of state dependence, Paternoster and Brame (2000) suggest that criminal

offending involves a mixture of time-stable individual differences in criminal propensity and the causal effects of criminal behaviour on subsequent criminality. Additionally, available data suggests that the age-crime relation is invariant across gender and race (Arneklev et al., 1999; Turner & Piquero, 2002).

Gottfredson and Hirschi (1990) do not identify gender as a factor that should alter the invariance and dimensionality of self-control. They point out that most agree gender is a major persistent correlate of crime with gender differences invariant over time and space. In "A treatise on Man," Adolphe Quetlet (1842, as cited in McLaughlin et al., 2003) found the propensity for crime to be about four times greater for men than women. Over the years, these ratios have remained relatively stable although the explanations for this apparent stability have changed. For example, Moffit, Caspi, Rutter and Silva (2001) contend that although males and females are equally vulnerable to the same risk factors, they are differentially exposed to risk factors for antisocial behaviour. However, Gottfredson and Hirschi assert that reasons for the observed gender differences in criminal behaviour are not important because the common underlying factor is still low self-control.

While acknowledging the large differences in crime rates across different societies, Gottfredson and Hirschi (1990) reject comparative criminology. Instead, they assert that cultural variability is not an important variable when considering the causation of crime. The assumption made is that individual pursuits of self-interest are a problem for all societies but that societies differ in the extent to which they provide opportunity to enjoy the proceeds of crime (Gottfredson & Hirschi, 1990). As such, GTC is not compatible with cultural explanations of crime.

In summary, Gottfredson and Hirschi (1990) conceptualise self-control as the general latent factor underlying a variety of criminal and analogous behaviour. They define self-control as the barrier that prevents individuals from succumbing to momentary temptations by a consideration of the long-term consequences of their behaviour. Gottfredson and Hirschi conceptualise self-control as a unidimensional factor comprising the six dimensions of impulsivity, physicality, risk seeking, preference for simple tasks, self-centredness and volatile temper. Low self-control is deemed the outcome of ineffective parenting practices, formed at a young age and

remaining relatively stable throughout life. As a general theory, GTC accounts for all crime and analogous behaviour across gender, culture and age.

On opportunity

Why is it that although everyone has an opportunity to engage in some kind of criminal act, at some time in life, these opportunities are usually passed by? The search for possible answers considers moral standards that inhibit behaviour, a lack of motivation or the fact that we do not all judge opportunities equally (Sheley, 1995). It is widely accepted that situation and personality interactions are crucial to any understanding of the dynamics of individual differences (e.g., Bartol, 2002; Cassel & Bernstein, 2001; Piquero & Tibbetts, 1996; Pratt & Cullen, 2000; Wolman, 1999; see also Eysenck, 1997). The motivation to crime is not the same for everyone and individual characteristics and situational circumstances may counteract the effects of low self-control (Grasmick et al., 1993). As such, Gottfredson and Hirschi (1990) stress that opportunity itself is only half the picture and self-control is what spurs a person to pursue one opportunity and ignore others. However, Gottfredson and Hirschi never actually define opportunity and, over time, they have shifted their theoretical perspective (Tittle, Ward & Grasmick, 2003). Initially GTC proposed that self-control interacts with opportunity to activate deviant behaviour. Hirschi and Gottfredson later state that opportunity and self-control are independent in their effects on crime and later still, that opportunity has only a conditional influence (Tittle et al., 2003).

Most tests of GTC have not successfully measured the equal availability of offending opportunities (Paternoster & Brame, 2000). Criminal opportunity is a function of the social structure and situational circumstances an individual experiences and acts as the link between self-control and crime (Gottfredson & Hirschi, 1990; Grasmick et al., 1993, Longshore & Turner, 1998). Although opportunities for specific behaviours vary by age, Gottfredson and Hirschi (1990) emphasise that delinquency and adult criminality both stem from the same causal roots; low self-control (see also Burton et al., 1999; Grasmick et al., 1993; Turner & Piquero, 2002). Criminal acts require “no special capabilities, needs or motivation and are, in this sense, available to everyone” (Gottfredson & Hirschi, 1990, p.88). Furthermore, Gottfredson and Hirschi emphasise that individuals with high levels of self-control are less likely, under all circumstances and no matter what the opportunity, to engage in criminal or analogous acts. In this way,

GTC focuses on self-control as a barrier to indulging in the immediate *pleasures* of the moment.

Although Gottfredson and Hirschi (1990) do not elaborate on the concept, criminal opportunity can be conceptualised as occasions when an individual could engage in acts of fraud or force without an immediate chance of being discovered (Grasmick et al., 1993; Longshore & Turner, 1998; Tittle et al., 2003). Typically, opportunities for fraud or force exist when a given criminal act is physically possible (Grasmick et al., 1993; Tittle et al., 2003). Although it is expected that opportunity will vary across individuals, Grasmick and colleagues (1993) point out that GTC fails to account for possible sources of such variance. By failing to address the possibility that social structures could affect an individual's exposure to crime opportunity, GTC aligns itself more with personality theory by focussing on individual variables as determinants of crime and neglecting social structure (Grasmick et al., 1993; O'Gorman & Baxter, 2002; Marcus, 2004).

Gottfredson and Hirschi (1990) do however describe situations in which acts of fraud or force are most likely to provide *pleasure*. The maximum opportunity for crime would be situations where acts of fraud or force will provide immediate pleasure, not require mental or physical exertion and where there is little risk of detection (Gottfredson & Hirschi, 1990). However, several authors have criticised the inconsistency in GTC between the "risk-taking" component of self-control and "little risk of detection" in the description of crime opportunity (e.g., Grasmick et al., 1993; Marcus, 2003; Pratt & Cullen, 2000, Tittle et al., 2003).

To summarise, although similar opportunities are available to everyone, Gottfredson and Hirschi (1990) assert that the pursuit of one opportunity over another is due to self-control. However, opportunity has not adequately been defined and, over time, Gottfredson and Hirschi have minimised the importance that opportunity plays in the prediction of criminal behaviour. The general themes of immediate pleasure and minimal mental or physical exertion are consistent in conceptualising opportunity. However, "risk-taking" as a component of self-control and "little risk of detection" in describing opportunity form an unresolved inconsistency. This inconsistency could possibly explain the theoretical changes that have affected the role of opportunity in

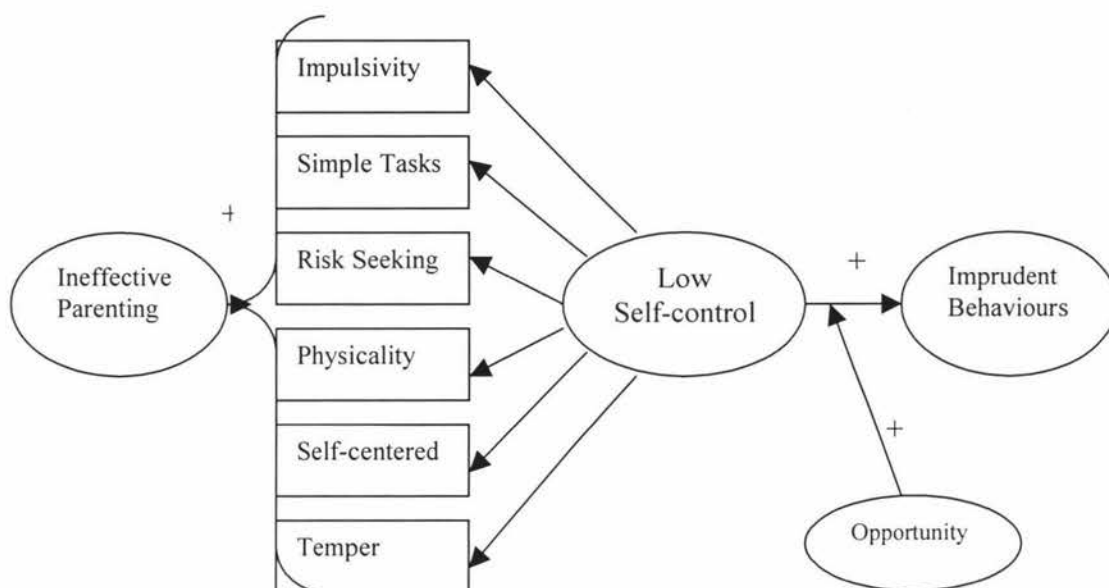
GTC. Furthermore, GTC fails to account for the apparent variability of opportunity across individuals and the suggestion that opportunity plays a different role in the commission of acts of fraud compared to acts of force.

Summary

Gottfredson and Hirschi's (1990) GTC centres on self-control, the outcome of early childhood socialisation in the family. This single unidimensional and enduring trait, self-control, is proposed as a sufficient explanation to account for all criminal acts and analogous behaviours across age, gender, culture, and historical and social periods. Gottfredson and Hirschi adopt a hedonistic position to define crime as the short-sighted pursuit of self-interested pleasure and criminality as the absence of self-control needed to consider the long-term consequences of one's behaviour for oneself and others. Gottfredson and Hirschi conceptualise self-control as comprising different elements that come together in a single, general factor. This factor explains, "the common variance of criminal and analogous acts responsible for the findings of versatility and stability on which GTC is based" (Marcus, 2003, p. 673). GTC asserts that individuals with low levels of self-control are vulnerable to the temptation of opportunities where acts of fraud or force are most likely to provide immediate pleasures. As such, self-control is posited as the barrier that prevents an individual from indulging in the momentary pleasures, that crime and analogous behaviours provide, by considering the long-term consequences of such behaviour. A conceptual model of Gottfredson and Hirschi's theory of low self-control is presented in Figure 1.

Gottfredson and Hirschi (1990) conceptualise crime and analogous acts as the behavioural manifestation of low self-control. However, they also assert that low self-control causes crime and hence GTC has attracted accusations of tautology. As a general theory, GTC asserts that individuals low in self-control will be more prone to engage in forceful and fraudulent behaviour in the uninhibited pursuit of immediate gratification. As such, all criminal and analogous behaviours are explained as a lack of concern for the long-term consequences of one's behaviour for oneself or others. Gottfredson and Hirschi further contend that it is possible, even desirable, to study crime by investigating analogous, non-criminal behaviour. This is seen as an attempt to overcome the charge of tautology by measuring behaviours that are independent of crime.

Figure 1. A Conceptual Model of low Self-control as defined in GTC



Wrestling with self-control

The problem of measurement

Although Gottfredson and Hirschi (1990) detail the characteristics of crime and criminality and suggest preferred methods of measuring self-control, GTC remains open to interpretation. As such, self-control has been understood and measured in various ways with mixed results. Nevertheless, a precise meaning of self-control is essential because Gottfredson and Hirschi propose this single latent construct as sufficient to explain all crime (Marcus, 2004).

Although Gottfredson and Hirschi (1990) insist that *the* appropriate indicators of self-control are measures of non-criminal, analogous behaviours, this creates a problem of tautology. The independent measurement of self-control from the very behaviour it is supposed to cause cannot be accomplished by measuring analogous behaviours as the independent variable and crime as the dependent variable (Akers & Jensen, 2003). Criminal and analogous behaviours are both caused by low self-control, hence both are indicators of criminal propensity (dependent variable) and cannot be used as measures

of the independent variable (self-control) (Akers & Jensen, 2003). However, tautology in empirical tests can be avoided if self-control and crime are measured independently and with valid instruments (Pratt & Cullen, 2000). The preferred non-tautological technique to overcome this problem is to use an attitudinal, or cognitive, measure of the self-control construct (Akers & Jensen, 2003; Tittle et al., 2003).

However, Gottfredson and Hirschi (1990) assert that an appropriate measure of self-control would be behavioural scales that assess participation in analogous, non-criminal behaviour (Marcus, 2004; Pratt & Cullen, 2000; Tittle et al., 2003). Furthermore, Hirschi and Gottfredson (1993) stress that observed behavioural reports are preferable to self-reports, because individuals low in self-control may be unwilling or unable to participate in surveys. However, in an investigation that compared various behavioural and attitudinal measures of self-control, Tittle and colleagues (2003) concluded, “either type of measure produces supportive evidence for the theory [GTC], and the behavioural measures provide no better prediction than do the cognitive measures (p. 333).

In tests of GTC, researchers have employed a wide range of operational measures of self-control and different methodological approaches (Pratt & Cullen, 2000; Tittle et al., 2003). Studies include attitudinal or cognitive measures (e.g., Evans et al., 1997; Gibbs et al., 1998; Grasmick et al., 1993) and behavioural or observational measures (e.g., Keane, Maxim & Teevan, 1993; Marcus, 2003; Paternoster & Brame, 1998). Although comprising attitudinal items, the 24-item self-control scale developed by Grasmick and colleagues (1993) has become the most widely used instrument in empirical tests of GTC (Marcus, 2004; Pratt & Cullen, 2000). Despite Gottfredson and Hirschi (1990) expressing a preference for objective behavioural indicators of self-control, they do concede that useful information can be gathered with surveys (Marcus, 2003; Tittle et al., 2003). Researchers are however urged to take into account GTC’s view of differences among potential respondents (Hirschi & Gottfredson, 1993) implying that extra efforts are required to include individuals low in self-control (Tittle et al., 2003). Furthermore, a consideration of the issues of versatility and stability necessitates that behavioural categories of highly diverse content and covering different life periods are tapped when measuring self-control (Marcus, 2003).

In summary, the themes and concepts of GTC remain open to interpretation. Consequently, self-control has been conceptualised and measured from different perspectives with mixed results. Despite Gottfredson and Hirschi's assertion that observed behavioural reports are the appropriate measure of self-control, empirical evidence concludes that attitudinal or behavioural measures are suitable. The Grasmick et al. (1993) self-control scale has become the most widely used measure; however, researchers are urged to make efforts to include respondents more likely to vary in levels of self-control and spanning different life-periods.

Empirical measurement of GTC self-control

Gottfredson and Hirschi (1990) contend that as a general explanatory concept, low self-control can be measured independently from the phenomenon it is said to cause and therefore it is directly testable. To date, most empirical tests of GTC have focussed on the core causal propositions, for example, the unidimensionality of self-control and the stability and versatility hypotheses (Pratt & Cullen, 2000; Tittle et al., 2003). However, Grasmick et al. (1993) identified "six components of the personality trait of low self-control" (p. 7) and developed a self-report scale to capture these components as defined in GTC. Grasmick et al. (1993) interpret "the elements of self-control" (Gottfredson & Hirschi, 1990, pp. 89-91) as describing individuals low in self-control to have personalities predisposing them to committing criminal or analogous acts.

Although the Grasmick et al. (1993) study failed to support the self-control and opportunity interaction, it did support the inverse relationship between self-control and criminal or analogous behaviours (Pratt & Cullen, 2000). Furthermore, despite criticism of the psychometric properties of the Grasmick et al. (1993) self-control scale (e.g., Longshore & Turner, 1998; Tittle et al., 2003), the major advantages of the scale are its logical independence from crime and that it has face validity with the concepts of GTC (Marcus, 2003, Pratt & Cullen, 2000).

Gibbs and Giever (1995) also interpret self-control as a general personality trait or disposition that enables individuals to make behavioural choices following a consideration of the long-term consequences for themselves and others. Individuals unrestrained by long-term interests are vulnerable to the temptation of immediate pleasures promised by crime and related acts (Gibbs & Giever, 1995). Furthermore, low

self-control impedes chances for success in employment, education and relationships and negatively influences the rate of participation in self-report surveys (Gibbs & Giever, 1995). The Gibbs et al. (1998) scale, developed with a university student sample, tries to capture an individual's concern for the consequences of their actions in a variety of contexts familiar to such a population. The Gibbs et al. (1998) study offers support for GTC by showing that their measure of low self-control is indeed related to general law violations (Pratt & Cullen, 2000). However, the scale does not specifically measure the dimensions of self-control as defined in GTC but attempts to capture an individual's concern for the consequences of their actions (Gibbs & Giever, 1995; Marcus, 2003).

Marcus (2003) suggests that previous research has not adequately operationalised the theoretical construct of self-control as defined in GTC. Furthermore, Marcus (2004) contends that a translation of the self-control concept into an operationally defined personality construct and development of a measure that taps into the specific trait, and not something else, is required. To this end, Marcus (2003) developed the Retrospective Behavioural Self-control scale (RBS) to meet the seven requirements that he regards as necessary to adequately measure self-control. These seven requirements are - (1) standardised testing, (2) a behavioural base, (3) tapping acts with long-term negative consequences for the actor, (4) consideration of the versatility and stability hypotheses, (5) controlling for systematic influences beyond self-control (e.g., age, gender), (6) logical independence of crime, and (7) acts that most people would have access to (Marcus, 2003).

Furthermore, Marcus (2003) argues that although attitudinal scales may yield psychometrically sound measurement, they are nevertheless theoretically inadequate and thus flawed. Additionally, in the Marcus (2003) study, it was found that the RBS measured something substantially different to the Grasmick et al. (1993) self-control scale; both in terms of relationships with other personality constructs and internal structure. However, in studies employing the RBS, Marcus (2003) found an effect size of .63 where deviant workplace behaviour was the dependent variable.

Contrary to Hirschi and Gottfredson's (1993) preference for behavioural measures, Tittle et al. (2003) failed to find a significantly stronger association between

behavioural measures and criminal or analogous behaviours, than between cognitive measures and criminal or analogous behaviours. Moreover, there is a suggestion that the domain of self-control tapped by behavioural measures may be different to the domain tapped by cognitive measures (Markus, 2003; Tittle et al., 2003). Furthermore, Tittle et al. (2003) concluded that it would be unreasonable to expect all forms of imprudent behaviour to be alike or equally reflective of low self-control. For example, investing in a risky yet profitable business venture and careful speeding along the motorway may actually depend on substantial self-control (Tittle et al., 2003). Similarly, a tendency to be adventurous and take risks, like climbing Mount Everest, would generally be regarded positively whereas risking the family fortune through gambling would be regarded as imprudent. Additionally, not every decision to forgo or delay gratification is positive. For example, miserliness, workaholism, anorexia nervosa and puritanical joyless sex bring distress via the over-avoidance of certain types of pleasures (Strayhorn, 2002)

Despite the lack of theoretical guidance, both attitudinally and behaviourally based measures of self-control consistently produce evidence favourable to self-control theory (Pratt & Cullen, 2000; Tittle et al., 2003). This contradicts Hirschi and Gottfredson's (1993) contention that behaviourally based measures would result in larger predictive coefficients for self-control. The reported association between self-control and crime, or analogous behaviour is consistently in the range of 0.20 to 0.30 across studies employing different methodologies and population groups (Pratt & Cullen, 2000; Tittle et al., 2003). This effect size ranks self-control as one of the strongest known correlates of crime when compared with other relevant studies (Andrews & Bonta, 1998; Pratt & Cullen, 2000). Furthermore, "regardless of the analysis undertaken, self-control was related to crime among men, in younger samples and in offender samples" (Pratt & Cullen, 2000, p. 952). However, not all longitudinal studies have supported the idea that self-control is a stable propensity unaffected by other variables across different life periods (Pratt & Cullen, 2000). Furthermore, Pratt & Cullen (2000) conclude that "despite different views of human nature and other theoretical tensions, support exists for both the general theory [GTC] and social learning theory" (p. 953).

Self-control in the Psychological tradition

The problem of definition and measurement

The issue of self-control has also received much attention in the psychological literature. Alfred Adler (1927, cited in Friedman & Lackey, 1991) proposed that the need to control one's environment was an "intrinsic necessity of life itself" (p.398). However, people must control themselves in order to control the environment. Since striving for control over life circumstances produces many social and personal benefits it permeates most things people do throughout life (Ajzen, 1988; Bandura, 1997; Carver & Scheier, 1981; Friedman & Lackey, 1991; Webster & Jackson, 1997). Although the unpredictability of the human will creates difficulties for any attempt to explain self-control by antecedent causes (Aiken, 1999; Ainslie, 2001), individuals who tend to show impulse control problems in one aspect of behaviour will also show these features in other parts of their lives.

As such, self-control can be understood as the process through which individuals are able to influence the variable that determines their own behaviour (Pelvin, 1975). For example, engaging in behaviours that result in delayed but more reward (Strayhorn, 2002). Consequently, the need to control behaviour and impulse has many personal and social benefits; therefore, self-control has been the focus of much debate and theory in the psychological tradition. However, although much has been written about self-control, there is still little consensus regarding exactly how to define or measure it.

Various authors have attempted to capture the meaning of self-control from different psychological paradigms. The social learning theorist, Rotter (as cited in Aiken, 1999), adopted a cognitive-behavioural approach to develop his model of internal-external locus of control. Rotter distinguishes between the belief that outcomes are under the control of one's own behaviour versus the belief that outcomes are under the control of external factors, such as powerful others or chance. Thus understood, self-control is an ordering of oneself from inside and not an imposition of control from the outside (Coloroso, 1995). Research has found a link between locus of control and the observation that individuals respond to the same stimuli in very different ways. Furthermore, Ajzen (1988) contends that external factors determine the extent to which circumstances may facilitate or interfere with the performance of behaviour and a lack

of opportunity may thwart attempted behaviours. Although a number of studies have found that offenders tend to externalise control, the status of locus of control is still inconclusive and has yet to produce consistent correlations with criminal or analogous behaviour (Ainsworth, 2000; Ajzen, 1988; Blackburn, 1994; Hollin, 1989).

Rooted in a cognitive behavioural conceptualisation of self-controlling behaviours, Rosenbaum (1980) developed a schedule for assessing learned resourcefulness. Four basic assumptions underlie this model - (1) human behaviour is goal directed, (2) self-control behaviour is elicited when individuals encounter obstacles in the smooth execution of goal directed behaviour, (3) self-control behaviour is always associated with certain process regulating cognitions, and (4) there are multiple and interactive factors that influence process regulating cognitions and self-control behaviours (Rosenbaum, 1990).

Thus understood, self-controlling responses are elicited by an internal event, such as anxiety, pain or thoughts, which disrupt the effective performance of a particular act (Rosenbaum, 1990). For example, a self-controlling response would be deep breathing in the face of exam anxiety. Additionally, Rosenbaum (1990) proposes that resourcefulness, instead of helplessness, is the personality variable to explain why most people do not succumb to a stressful environment. However, Rosenbaum's conceptualisation of self-control does not fully capture the themes of GTC. The focus is on self-regulation and cognitive mediation of emotional states and not consideration of the long-term consequences of one's behaviour for oneself.

Concepts of motivation are essentially concepts of self-regulation, accounting for the direction that behaviour takes and the intensity with which the act is executed (Carver & Scheier, 1981). Thus, from a motivational paradigm, behaviour is regarded as the outcome of cognitive self-regulation. Albert Bandura (1997) proposed a model of self-efficacy in which negative and positive expectancies are an important determinant of behaviour; emphasising the difference between being driven by an efficacy motive and being motivated by the anticipated outcomes. Closely related to this model is Ajzen's (1988) concept of perceived behavioural control. Bandura (1997) suggests efficacy beliefs are a major basis for behaviour and unless people believe that they can produce desired effects by their actions, they have little incentive to act. The general

idea is that changes in self-perceived efficacy will mediate - (1) the likelihood that coping behaviours will manifest in stressful situations, (2) the degree of effort expended in coping attempts, and (3) the degree to which efforts are sustained when aversive conditions are encountered (Bandura, 1997; Carver & Scheier, 1981). Furthermore, self-control is not considered an intrinsic property of the behaviour itself but the context and history of behaviour are important factors that determine whether the behaviour is self-control or not (Rodin, 1982). For example, consider the non-drinker and the drunk both declining a drink. Clearly, self-control requires a situation where something that is valued is available (Rodin, 1982). Although empirical support for Bandura's perceived self-efficacy has been found in separate studies (Ajzen, 1988), the concepts and themes of self-efficacy do not fully capture self-control as defined in GTC.

Similarly, the control-theory of Carver & Scheier (1981) upholds the importance of positive and negative expectancies, although emphasising an individual's assessment of the desired outcome occurring (Boekarts et al., 2000; Carver & Scheier, 1981). In helplessness phenomena, a person's expectancies of controlling desired outcomes play an important role (Bandura, 1997; Boekarts et al., 2000, Carver & Scheier, 1981). Favourable outcome expectancies lead to behaviour that is more persistent while unfavourable expectancies lead to "giving-up" (Carver & Scheier, 1981). Seligman's (1975) model of "learned helplessness" proposes that people behave resignedly when they acquire expectancies that they are unable to affect outcomes through their own actions. Therefore, an inability to exert influence over things that adversely affect one's life leads to apathy, apprehension or despair (Bandura, 1997). However, the theory of positive and negative outcome expectancies is not entirely compatible with the GTC theme of failing to consider long-term consequences of behaviour.

William Powers (cited in Carver & Scheier, 1981) examined the nature of control processes and the way in which they might be realised in the human nervous system. According to this model, a hierarchy of control systems structures the human nervous system, each level controlling a different aspect of behaviour. Given that there are multiple ways to perceive any given stimuli and multiple ways in which one can respond, the physical execution of behaviour is regarded as the translation of intentions into acts (Carver & Scheier, 1981). Similarly, Ajzen (1988) regards willful behaviour and volitional control as the result of deliberate attempts. However, a person's intention

remains a behavioural disposition until the appropriate time and opportunity result in an attempt to translate that intention into action (Ajzen, 1988). In contrast, GTC proposes that individuals low in self-control are vulnerable to the temptations of immediate pleasure rather than intentionally acting to their own detriment.

Studies investigating the self-imposed delay of gratification in children, suggest that this cognitive skill is optimal by ages nine to ten (Blackburn, 1994). Additionally, the evolution of human language to a system of self-regulation and personal reflection also supports a capacity for delaying motor responses to a signal (Hayes, Barnes-Holmes & Roche, 2001). As such, the delay of gratification involves a consideration of future consequences and a cognitive analysis of the situation. Ross and Fabiano (cited in Hollin, 1989) suggest that a failure in self-control may be due to a variety of factors, for example, “a failure to learn to stop and think, a failure to learn effective thinking, a failure to generate alternative responses, or a reflection of hopelessness” (p.48). As such, self-control is conceptualised as a cognitive skill that is different to the elements of Gottfredson and Hirschi’s (1990) self-control theory.

To summarise, each domain of psychology appears to produce area specific knowledge and uses their own scientific terminology to cover specific aspects of self-control (Boekarts et al., 2000). The result is a kaleidoscope of terms and labels that do not form a unified conceptualisation of self-control acceptable to each domain.

Insights from personality theory

A fascination with the idiosyncrasies and complexities of human behaviour and mental life, and the assessment of personality is as old as humanity itself (Aiken, 1999; Barone et al., 1998; Pelvin, 1975, Wolman, 1999). What drives people to act in certain ways? To what extent is behaviour based on nature rather than nurture? How are the different facets of personality organised to produce unique patterns of perceiving, thinking and acting? The oldest explanations offered a limited categorical approach to personality type. Currently a more holistic definition is preferred, including affective, cognitive, behavioural and mental variables to differentiate between individuals (Aiken, 1999). Some theorists have also replaced the nomothetic search for general laws with an

idiographic approach where individuals are regarded as integrated systems worthy of analysis in their own right (Aiken, 1999; Pelvin, 1975; Wolman, 1999).

Major issues that personality theorists have grappled with are related to explaining behaviour. Theorists attempt to explain the factors that cause individuals to behave in certain ways and how social and non-social experiences shape personality during childhood and later in life (Aiken 1999; Barone et al., 1998; Eysenck, 1967; Pelvin, 1975). However, no *one* comprehensive theory is supported by all schools of thought and even atheoretical empirical studies still make assumptions, or have certain preconceptions, with regard to the nature of personality and expected outcomes of research. In personality psychology, five broad groups of theory have been identified - type, psychodynamic, social learning, phenomenological (humanistic), and trait-factor (Aiken, 1999; Barone et al., 1998; Pelvin; 1975).

One of the oldest explanations of personality suggests that people fall into fixed categories or types. Hippocrates' (430 BC, as cited in Aiken, 1999) humoral theory and the four corresponding temperaments of sanguine, melancholic, choleric and phlegmatic were one of the most widely cited typologies in ancient times. However, type theory has been criticised for overemphasising internal causation of behaviour and labeling individuals, which may lead to self-fulfilling prophecies.

Traditional psychoanalysis emphasises the psychosexual stages of development, aggressive and sexual impulses and the unconscious (Aiken, 1999; Barone et al., 1998; Pelvin, 1975). Freud's (cited in Aiken, 1999) psychoanalytic theory conceptualises personality as a battleground where unconscious processes and drives, id, ego and superego, struggle for supremacy. As a theory of personality, psychoanalysis deals with motivation, responses to biological and environmental forces and the interaction of various motives (Aiken, 1999; Barone at al., 1998; Strayhorn, 2002). As such, the reality principle accounts for self-control whilst the pleasure principle explains weak self-control, or impulsivity (Strayhorn, 2002).

As previously discussed, the cognitive-behavioural approaches of social learning theorists like Julian Rotter (cited in Aiken, 1999) and Albert Bandura (1997) focus on issues of reinforcement, expectancies, locus of control, modeling and self-efficacy in an

attempt to explain behaviour learned in a social context and differences among individuals (Ajzen, 1988; Carver & Scheier, 1981).

In contrast to type, psychoanalytic, trait-factor or social learning theories, phenomenological theorists emphasise the analysis of immediate, personal and subjective experience (Aiken, 1999; Pelvin, 1975). Phenomenologists adopt an idiographic approach and prefer to use individual case studies and open interviews in the assessment of personality.

Traits, or factors, are a seemingly more popular way of describing personality in terms that are narrower and less general than personality types (Aiken, 1999; Barone et al., 1998; Eysenck, 1977; Pelvin, 1975). As such, traits capture an individual's predisposition to respond in a particular way and these responses are considered the behavioural manifestation of underlying traits. Furthermore, Aiken (1999) points out that traits have served as a framework for constructing several well-researched personality inventories, for example - the Eysenck Personality Questionnaires (Eysenck & Eysenck, 1975), the Multidimensional Personality Questionnaire (Tellegen, 1982), the NEO Personality Inventory (Costa & McCrae, 1992), and the Sixteen Personality Factor Questionnaire (Cattell & Eber, 1962).

However, the trait-factor study of personality has suffered much debate and disagreement regarding the number of major personality factors or dimensions (Barone et al., 1998; Block, 1995; Eysenck, 1997). Since early Greek philosophy, the major dimensions of Extraversion and Neuroticism have been recognised and routinely appear in many factor studies of personality (Eysenck, 1997). Currently, the "Big 5" concept is popular and regarded as representing the major dimensions of personality (Block, 1995; Costa & McCrae, 1992). However, this model has been criticised as not being embedded in a proper nomological network, standing without causal implication, and being logically and methodologically flawed (Block, 1995; Digman, 1990; Eysenck, 1997). Furthermore, it has been suggested that the "Big 5" dimensions reduce to super-factors similar to the Eysenckian dimensions of extraversion, neuroticism and psychoticism (Digman, 1990; Eysenck, 1997).

Similarly, Zuckerman's (1984) sensation seeking model and Tellegen's (1982) multidimensional model of personality factor into three dimensions reflecting the Eysenckian dimensions of extraversion, neuroticism and psychoticism (Digman, 1990). Furthermore, Zuckerman's (1984) concepts of impulsive, unsocialised and sensation seeking are offered as an alternative interpretation of Eysenck's (1977) psychoticism (Digman, 1990). In an analysis of the Sixteen Personality Factor Questionnaire, three meaningful clusters of scales, extraversion, neuroticism and open versus closed to experience, were found (Costa & McCrae, 1992; Digman, 1990). Additionally, a strong correlation between Eysenck's (1977) psychoticism dimension and the factors of agreeableness (friendliness/hostility) and conscientiousness (will), as defined in the five-factor model of personality, has been found (Digman, 1990; Eysenck, 1997).

In summary, there have been many developments in personality psychology as theorists have sought to understand and explain the idiosyncrasies and complexities of human behaviour. However, there is little uniformity of nomenclature and the five broad groups of personality theory continue to offer different perspectives by which to understand self-control. Personality trait theory attempts to capture an individual's tendency to respond in a particular manner and explains behaviour as the manifestation of underlying traits. As such, personality trait theory appears compatible with the general themes and concepts of Gottfredson and Hirschi's (1990) self-control theory.

Eysenck's theory of personality

Eysenck's (1967) personality theory has evolved over many decades of empirical investigation and continues to stimulate research (e.g., Aiken, 1999; Revelle, 1997). As a behaviourist, Eysenck (1967) regarded learned habits of great importance although he considered particular aspects of personality to have a biological base. Therefore, he postulated a strong causal relationship between certain personality types and specific behaviour (Sheley, 1995). Eysenck's (1967, 1977) model of personality postulates extraversion, neuroticism and psychoticism as biological intermediaries needed to translate genetic potential and environmental pressures into behaviour.

According to Eysenck (1967, 1977), the central nervous system (CNS) determines reactions to external stimulation. In extraverts, the CNS dampens stimuli before they reach the cerebral cortex and, in introverts, the CNS magnifies stimuli

(Eysenck, 1967). Thus, introverts often feel overloaded by external stimuli and tend to avoid stimulus-producing situations whereas extraverts experience a need for increased stimulation (Ainsworth, 2000; Blackburn, 1994; Eysenck, 1967, 1977; Sheley, 1995). As such, extraversion is characterised by qualities such as being outgoing, active and carefree, and in need of external stimulation (Eysenck, 1990; Revelle, 1997).

Eysenck (1967) proposes that neuroticism is based on activation thresholds in the sympathetic nervous system responsible for the fight-or-flight response in the face of danger (Ainsworth, 2000; Sheley, 1995). As such, individuals high on Neuroticism have low activation thresholds and tend to experience negative affect in the face of minor stressors. Neuroticism is characterised by qualities such as being reserved, pessimistic, anxious and moody (Eysenck, 1990).

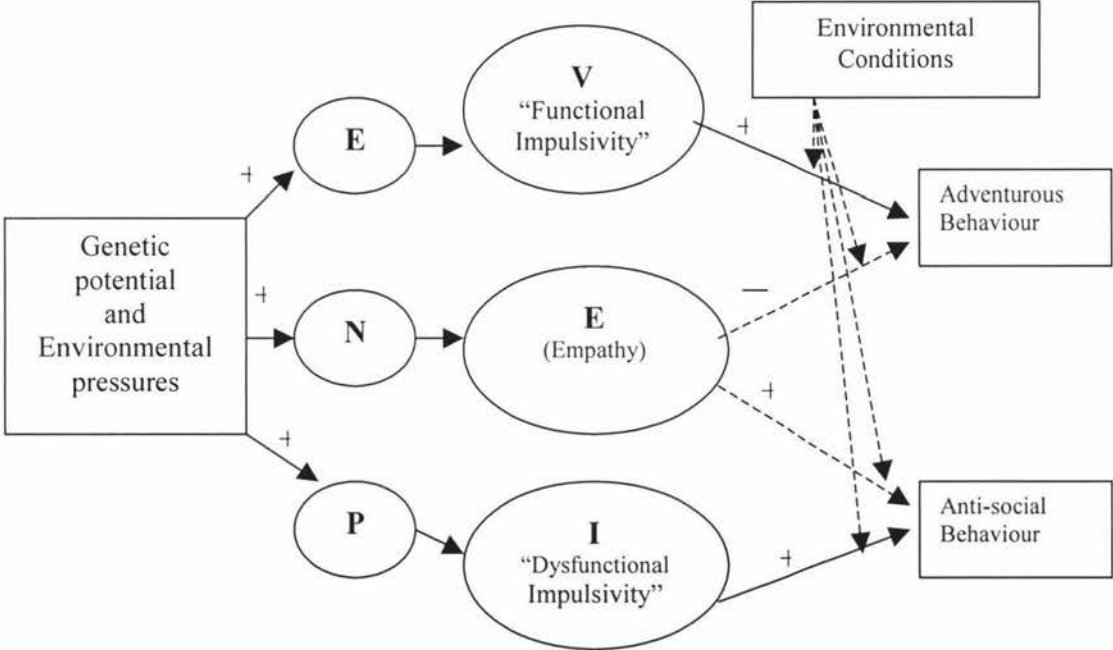
Although not as clearly defined, or empirically validated, the physiological basis suggested for psychoticism is testosterone (Ainsworth, 2000). The dimension of psychoticism is characterised by non-conformity, inconsideration, tough-mindedness, hostility and impulsiveness (Eysenck, 1990; Eysenck, Eysenck, & Barrett, 1985; Revelle, 1997).

Connected with self-control deficiencies is the concept of impulsivity, a failure to think about the consequences of one's actions (Strayhorn, 2002). Impulsivity remains a core feature of Eysenck's personality theory and an important variable in linking personality and crime (Eysenck, 1977; Eysenck & Gudjonsson, 1989). Initially considered as a main component of extraversion (Eysenck, 1967), impulsivity has come to be regarded more as a component of the psychoticism dimension, uncontrolled stimulation seeking and psychopathic behavior (Aiken, 1999; Eysenck & Eysenck, 1975; Eysenck & Gudjonsson, 1989; Eysenck & Eysenck, 1978; Eysenck, Eysenck, & Barrett, 1985; Revelle, 1997).

In developing the Eysenck Personality Questionnaire (EPQ), Eysenck and Eysenck (1975) discovered that impulsiveness was not a unitary dimension. Certain aspects of impulsivity, such as sociability and calculated risk-taking behaviour, were considered better defined by Extraversion while other aspects of impulsivity, such as impulsiveness and absolutely no consideration of the consequences of behaviour,

aligned more with Psychoticism (Eysenck & Eysenck, 1975). Consequently, impulsivity items were moved onto the Psychoticism scale leaving the Extraversion scale with adventure seeking and sociability items. At the same time, a new series of questionnaires, the I-series and IVE, were specifically designed to measure Impulsivity, Venturesomeness and Empathy (Eysenck & Eysenck, 1978; Eysenck, Eysenck, & Barrett, 1985; Eysenck, Pearson, Easting and Allsop, 1985; Revelle, 1997). As such, Impulsivity taps a tendency to behave without much thought, or realisation, of the risks involved while Venturesomeness taps the tendency to act in full awareness of the risks involved (Eysenck et al., 1985; Revelle, 1997). As such, Psychoticism is aligned with Impulsivity, Extraversion is aligned with Venturesomeness and Empathy is considered an inhibiting barrier more aligned with Neuroticism. A conceptual model of Eysenck’s theory of personality and impulsivity is presented in Figure 2.

Figure 2. A Conceptual Model of Eysenck’s theory of Personality and Impulsivity



Falling within the rubric of psychological control theories, Eysenck’s (1977) theory of personality and crime proposes that a conscience is a conditioned reflex (Downes & Rock, 1998). Eysenck (1977) hypothesises that Classical conditioning is at the basis of developing a conscience. As such, high arousal would facilitate conditioning, therefore introverts would respond to conditioning stimuli better than

extraverts would. Evidence in support of this hypothesis comes from empirical studies that have found criminals difficult to condition experimentally (e.g., Raine, Venables & Williams, 1996). Furthermore, Downes and Rock (1998) suggest that psychological control theories appear to have had a disguised resurrection in recent theories on crime. As examples of this trend, Downes and Rock (1998) cite “Clarke and Cornish’s radical behaviourism sympathetic to rational choice, Wilson and Herrnstein’s crime and human nature and, Gottfredson and Hirschi’s General Theory of Crime” (p. 260).

Extensive research in many parts of the world generally support the three Eysenckian dimensions of personality, but support is less convincing when applied to criminality (Bartol, 2002; Cassel & Bernstein, 2001; Sheley, 1995). Despite this, Eysenck’s (1990) major dimensions of personality, Psychoticism, Extraversion and Neuroticism, are found in most models and measures of personality. For example, biological models such as those of Cloninger (1987), Gray (1987) and Zuckerman (1984); the five-factor model (Costa & McCrae, 1992; Digman, 1990); the lexical hypothesis of Cattell (1945; cited in Block, 1995); the California Psychology Inventory (Gough, 1975); and the Minnesota Multiphasic Personality Inventory (Hathaway, & McKinley, 1940). Nevertheless, critics have questioned the adequacy of Eysenck’s (1977) theory as an explanation of criminality, pointing to the conceptual ambiguity of psychoticism, the lack of theory linking psychoticism to socialisation and, although carrying theoretical significance attached to extraversion, the recent alignment of impulsivity with psychoticism (Blackburn, 1994). However, testing the prediction that anti-social behaviour is related to high levels of Psychoticism and Neuroticism provides a focus for examining relationships between crime and personality.

Eysenck (1990) has responded to negative research findings by referring to the influence of age, methodological weakness of many investigations, heterogeneity of offenders and incarceration impeding accurate measurement (Blackburn, 1994; Eysenck & Gudjonsson, 1989). Furthermore, Eysenck (1977) points out that Psychoticism (P), Extraversion (E) and Neuroticism (N) are differentially relevant in young and older criminals, that the P, E, N scales do successfully distinguish between categories of criminals, and that incarceration prevents actual social behaviour thereby affecting the E scales (Blackburn, 1994). Additionally, self-report studies on the association of

Extraversion and Psychoticism with anti-social behaviour have delivered the strongest support, in particular for items relating to boredom and impulsivity (Blackburn, 1994).

Impulsivity as an important correlate of crime

Impulsivity is a vaguely defined term, generally understood as the inability to deter gratification and a tendency to act on impulse without concern for long-term consequences. Furthermore, much that has been written about self-control is indexed under the concept of impulsivity or impulse control problems (Strayhorn, 2002). Thus understood, impulsivity can be conceptualised as analogous to low self-control as defined in GTC.

Impulsivity is central to clinical concepts of a psychopathic personality and an imprudent lifestyle that includes, for example, drinking, smoking, gambling and promiscuity (Ainsworth, 2000; Blackburn, 1994). Similarly, Akers and Jensen (2003) have found impulsivity, as defined in GTC, to have significant net effects in a regression model investigating alcohol and tobacco use. However, conceptual ambiguities fuel disagreement over whether impulsivity is a primary trait or a higher-order dimension (Blackburn, 1994). In Eysenck's (1977) theory of criminality, impulsivity is the most important component and carries the theoretical significance of low arousal, low conditionability and an undeveloped conscience (Bartol, 2002; Blackburn, 1994; Eysenck, 1977; Eysenck & Gudjonsson, 1989; Hollin, 1989).

An inability to delay gratification and failure in self-control, leading to impulsivity, figure repeatedly in the literature seeking to explain criminal behaviour (Ainslie, 2001; Andrews & Bonta, 1998; Blackburn, 1994; Cassel & Bernstein, 2001; Eysenck & Gudjonsson, 1989; Gottfredson & Hirschi, 1990; Putwain & Sammons, 2002; Sheley, 1995; Webster & Jackson, 1997). It would seem that different definitions and measures of self-control, and the heterogeneity of the offender population, have resulted in the observed inconsistencies between findings (Hollin, 1989). However, a consistent finding in the literature is the impulsive disposition of criminals (e.g., Blackburn, 1994; Eysenck, 1977; Putwain & Sammons, 2002). Furthermore, there are indications that impulsivity may contribute to variations in frequency and type of offending and that recidivists are more impulsive in general (Ainsworth, 2000; Blackburn, 1994).

Impulsivity is an important factor in personality theory and appears in different guises in most multi-trait personality inventories. Examples of these are – the Control/Impulsiveness subscale of the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982), describing persons scoring low as spontaneous, reckless, careless and impulsive; the Factor *G* scale of the Sixteen Personality Factor Questionnaire (Cattell & Eber, 1962), assessing expedience versus conscientiousness; the Impulsiveness Questionnaire of the Eysenck Personality Scales (Eysenck & Eysenck, 1991), tapping a tendency to behave without consideration of the risks involved; the Impulsiveness subscale of the Neuroticism scale of the NEO Personality Inventory – Revised (NEO-PI-R; Costa & McCrae, 1992) assessing the degree to which an individual is in control of their emotions and behaviours; the Impulsivity subscale and the Harm Avoidance subscale of the Personality Research Form (PRF; Jackson, 1984), assessing (a) the tendency to act immediately without deliberation, readily vent feelings and possibly be volatile in emotional expression, and (b) the avoidance of risk to bodily harm, dislike of exciting activities and seeking to maximise personal safety; the Restraint subscale of the Guilford-Zimmerman Temperament Survey (Guilford, Zimmerman & Guilford, 1976) assessing the happy-go-lucky, carefree and impulsive individual; and the Self-Control subscale from the California Psychological Inventory (Gough, 1975), assessing the freedom from impulsivity and self-centeredness versus the adequacy and degree of self-regulation and self-control.

Additionally, based on an information processing approach to personality, Scott Dickman (1990) proposed a bi-dimensional theory of impulsivity. Observing that impulsivity has positive as well as negative consequences, Dickman differentiated between functional and dysfunctional impulsivity. Functional impulsivity is associated with adventuresomeness, activity and enthusiasm while dysfunctional impulsivity is associated with acting without forethought, disorderliness and a tendency to ignore facts when making a decision (Dickman, 1990; Whiteside & Lynam, 2001). Dickman's (1990) concept of Functional impulsivity reflects the Eysenckian dimension of Venturesomeness and Dysfunctional impulsivity reflects the Eysenck's (1991) dimension of Impulsivity.

In summary, although vaguely defined, impulsivity can be conceptualised as similar to low self-control as defined in GTC. Furthermore, impulsivity is the most

important component in Eysenck's theory of crime and a consistent finding in research is the impulsive disposition of criminals. Although impulsivity appears in different guises in most multi-trait personality inventories, Dickman (1990) differentiates between functional and dysfunctional impulsivity. As such, his impulsivity inventory attempts to capture both positive and negative aspects of impulsivity.

Crime and Personality

Brezina and Piquero (2003) observe that most people are deviant in some, but not all, aspects of their lives and activities and even deviants are conforming most of the time. Sutherland (cited in Andrews & Bonta, 1998) made room for personality and predispositional variables in his differential association theory and Akers and Jensen (2003) do not deny that personality or neuropsychological factors play a role for some criminals and in some crimes. However, personality traits in isolation generally seem to have limited explanatory power. The trait itself is inferred from observed or self-reported behaviour and the explanatory power lies in the fact that it accounts for a specific behavioural tendency in terms of a more general response disposition (Ajzen, 1988).

Understood as a predisposition to commit crimes, criminality is a continuously varying trait ranging from altruistic and normal behaviour to criminal and anti-social behaviour (Ainsworth, 2000; Blackburn, 1994; Hollin, 1989; Sheley, 1995). In an attempt to explain why some people fail to comply with the rules, Eysenck (1977) proposed a descriptive model and biological basis of personality and a control theory of socialisation to account for the characteristics of criminals (Ainsworth, 2000; Blackburn, 1994; Sheley, 1995). Similar to Gottfredson and Hirschi (1990), Eysenck (1967) adopts the view that humans are naturally hedonistic. Therefore, through effective socialisation, restraints are acquired and a conscience is developed as a conditioned response to punished behaviour (Blackburn, 1994; Eysenck & Gudjonsson, 1989; Sheley, 1995). Furthermore, a child's degree of conditionability and the quality of conditioning received in childhood will influence adult behaviour (Blackburn, 1994; Eysenck & Gudjonsson, 1989). Although regarded as a heterogeneous group, Eysenck (1977) asserts that criminals will be more impulsive, tough-minded and have lower arousal levels and weaker conditionability (Blackburn, 1994; Eysenck, 1977; Eysenck & Gudjonsson, 1989).

Personality studies of criminals have employed many different psychological tests. Although most comparisons of criminal and non-criminal samples have found significant differences, there have been few successful replications (Andrews & Bonta, 1998; Blackburn, 1994). Failure to replicate may be due to many studies being method-driven without a clear theoretical rationale of the personality variables related to crime, selection bias, and an implicit assumption that offenders are a homogenous group (Blackburn, 1994; Sheley, 1995). Although it seems unlikely that one specific trait in isolation mediates offending, investigations of interactions between person variables remain sparse.

Although psychopathy has a long history of being implicated in criminal and anti-social behaviour, many psychopaths are not criminal and not all criminals are psychopaths (Sheley, 1995). While the defining characteristics of psychopathy may well describe the criminal, they could also suit successful politicians, executives and television evangelists (Sheley, 1995). The personality traits most consistently implicated in criminals are impulsiveness, stimulation seeking, lacking affect, insensitivity to others and poor socialisation (Miethe & McCorkle, 2001; Moffit et al., 2001; Sheley, 1995; Wolman, 1999). Of these, impulsiveness has consistently attracted the most interest and support (Blackburn, 1994; Putwain & Sammons, 2002).

In summary, personality variables play an important role in understanding behaviour. As such, criminality can be understood as a continuously varying trait ranging from altruistic and normal behaviour to criminal and anti-social behaviour. Although some research has found significant personality differences between criminal and non-criminal samples, investigations of interactions between person variables remain sparse. Many defining characteristics that describe criminals could just as easily describe successful risk takers.

Toward conceptual clarification of self-control

Due to the absence of a coherent “model of man”, an integrated theory struggles for advancement against the more traditional theories (Blackburn, 1994). A review of the major theories reveals diverse perspectives of the issues of self-control and

impulsivity (Ainsworth, 2000; Bartol, 2002; Blackburn, 1994; Webster & Jackson, 1997). Psychodynamic theories perceive delay of gratification to be a function of ego control. Learning theorists focus on self-regulation as an acquired behaviour that is context specific. Behaviourists consider self-control in terms of situational control while social learning theorists consider self-regulation as under the control of attentional processes, standards of self-reinforcement and outcome expectancies. Cognitive-behaviourists focus on inner speech as the verbal regulation of behaviour. Similarly, theories in criminal behaviour differ in their focus on crime (an aggregate of criminal activities), crimes (specific acts), and criminality (a disposition to engage in such acts) (Andrews & Bonta, 1998; Blackburn, 1994; Hollin, 1989).

By accepting that any particular behaviour is a complex interaction of genetic, social and environmental factors, it would seem naïve to search for *one* single cause of criminal behaviour (Ainsworth, 2000). Furthermore, personality theorists and social psychologists are rediscovering the connection between traits and attitudes, the way they are defined and measured and the implications for the prediction of behaviour (Ajzen, 1988). An assessment of attitudes and personality may unveil hidden factors that have come to predispose an individual to act in certain ways (Campbell, as cited in Ajzen, 1988). If self-control, as defined in GTC, is more than old wine in new bottles, a measure should show discriminant validity when compared with measures of more traditional personality traits and incremental validity when related to independent variables (Andrews & Bonta, 1998; Marcus, 2004).

In conclusion, Gottfredson and Hirschi propose self-control as the necessary and sufficient variable to account for all criminal and analogous behaviour. Criminals are generally considered to be deficient in control or delay functions because they act to satisfy immediate needs without considering the long-term aversive consequences. Deficiencies in self-control appear to be linked to the concept of impulsivity, a proneness to emotional outbursts and acting suddenly without considering the consequences of behaviour. However, impulsivity is an important variable in personality theory and is found in most trait measures of personality. Therefore, it seems reasonable that an integration of personality variables with the components of self-control as defined in GTC could clarify the operationalisation and measurement of self-control as it relates to criminal and analogous behaviour.

Aim and general hypothesis

A review of the literature and research indicates that there have been few attempts to establish explicit connections between self-control, as defined by Gottfredson and Hirschi, and facets of personality. However, it seems feasible that a re-conceptualisation of self-control as a composite of personality traits would broaden understanding and clarify the nomological net. To this end, this study investigated the inter-relationships between factors of self-control as defined in GTC and personality dimensions. Specifically, the relationship between the six components of self-control as measured by the self-report scale developed by Grasmick et al. (1993) and the three major dimensions of personality as proposed by Eysenck (1967, 1977) will be analysed.

Furthermore, construed as the opposite of self-control, impulsivity receives specific attention as a personality construct and the hypothesised relationship with self-control as defined in GTC will be analysed. Additionally, in accordance with Gottfredson and Hirschi's assertions, a behavioural scale with diverse non-criminal analogous behaviours, readily accessible to most people, was included as an alternative and comparative measure of self-control. Specifically, an attempt to understand the construct of self-control as defined in GTC by analysing, within the framework of a well-validated personality model, the inter-relationships of measures of personality traits, self-control and impulsivity is undertaken. This serves as an attempt to enhance the current conceptualisation and improve the construct validity of self-control measurement.

The broad hypothesis that guides this investigation is that the meaning of self-control, as defined by Gottfredson and Hirschi, could be better re-conceptualised as a composite of personality traits. Based on a review of theoretical assertions and previous research, this research specifically aims to investigate the following –

1. That the components of GTC self-control as measured by the Grasmick et al. (1993) self-control scale (GRAS) will

- a) correlate with different domains and facets of personality as measured by the Abbreviated form of the Revised Eysenck Personality Questionnaire (EPQR-A) (Francis, Brown & Philipchalk, 1992). In particular, the following positive associations are expected - Risk Seeking and Physical Activities with Extraversion, Impulsiveness and Self-centeredness with Psychoticism, and Simple Tasks and Temper with Psychoticism and Neuroticism.
- b) have a strong positive relationship with imprudent behaviours as measured by an adapted version (RBS) of the Marcus (2003) Retrospective Behaviour Scale. Specifically, the components of Impulsivity, Self-centeredness, Simple Tasks and Temper will have a strong positive relationship with the RBS. However, a weaker relationship is expected between Risk Seeking and the RBS while Physical Activities is expected to show the least effective relationship with the RBS.
- c) be better explained by the two conceptually distinct constructs of impulsivity proposed by Dickman (1990). The factors of Risk Seeking and Physical Activities will have a stronger relationship with Functional impulsivity while the components of Impulsiveness, Self-centeredness, Simple Tasks and Temper will be positively associated with Dysfunctional impulsivity.

2. The independent dimensions of impulsivity as measured by the Dickman (1990) Impulsivity Inventory (DII) will

- d) show different relationships with the EPQR-A domains of personality. Positive correlations are expected between Extraversion and Functional impulsivity and between Psychoticism and Dysfunctional impulsivity. Furthermore, Neuroticism is expected to have a negative relationship with Functional impulsivity and a positive relationship with Dysfunctional impulsivity.
- e) Dysfunctional impulsivity will have a strong positive association with the RBS while a weak positive relationship is expected between Functional impulsivity and the RBS.

3. The EPQR-A domains of personality will

- f) have a relationship with the RBS, mediated by impulsivity as measured by the DII. Specifically, Dysfunctional impulsivity will mediate the relationship of Psychoticism and Neuroticism with the RBS and Functional impulsivity will mediate a weak relationship between Extraversion and the RBS.
- g) As a measure of social desirability, the Lie scale is expected to show an overall negative relationship with GRAS self-control, Dysfunctional impulsivity and the RBS.

4. Hypothesised model -

- h) including factors of personality is expected to enhance the measurement of GTC self-control and prediction of RBS imprudent behaviours. A structural equation model that includes the inter-relationships between the GRAS components of self-control, EPQR-A dimensions of personality, DII independent constructs of impulsivity and RBS imprudent behaviours is expected to have adequate goodness-of-fit statistics and parameter estimates. Furthermore, this model of inter-relationships is expected to be a better explanation of the variance and indicate better fit statistics compared with an alternative model depicting independence between variables of GTC self-control and personality.

Method

Participants and Setting

Setting of the study

This cross-sectional survey study was conducted in New Zealand via anonymous postal questionnaire. Participants were students and faculty staff from the Massey University campuses at Albany, Palmerston North and Wellington providing a good mix of both city and urban areas.

Population Sample

General population samples, especially adults, are expected to have moderate levels of self-control. Therefore, Hirschi and Gottfredson (1993) recommend stratified disproportionate sampling to ensure adequate variation on the dependent variable. In the present study, a sample comprising university students and faculty staff was considered suitable to produce sufficient variation in levels of self-control and self-reported imprudent behaviours. As such, a random convenience sample of students, younger than 25 years old, and academic faculty staff were targeted. Furthermore, the targeted groups were considered suitable as participants for self-report questionnaire surveys due to their being literate, accustomed to completing surveys and characterised as responding reliably to self-report items (Gibbs et al., 1998; Gottfredson & Hirschi, 1990; Romero et al., 2003). In addition, previous studies have successfully been conducted with university populations and participants ranging in age from 18 to 70 (e.g., Gibbs & Giever, 1995; Marcus, 2003; O’Gorman & Baxter, 2002; Romero et al., 2003). Furthermore, Gottfredson and Hirschi (1990) assert that their theory is relative. As such, no matter what group is studied, higher levels of self-control will reflect lower deviance.

However, the present sampling design may be problematic in that selection did not involve probability sampling. Therefore, the sample could be biased in unknown ways, which may affect hypothesis testing and parameter estimation (Rosnow & Rosenthal, 1996). However, given the realities of research in the social sciences, nonprobability samples are common (Gibbs, Giever & Higgins, 2003).

Sample characteristics

In total, 461 questionnaires were distributed; 166 were sent to students and 295 to faculty staff. In total, 194 completed questionnaires were received; 125 from students, 59 from faculty staff and four questionnaires were missing all demographic information. Therefore, the overall response rate was 42.1%; the response rate for students was 75.3% while the response rate for faculty staff was 20%. The obtained sample size in the present study, although not ideal, is similar to previous research and considered adequate to detect statistically significant effects.

Participant demographic characteristics are presented in Table 1. Participants were 36.5% ($n = 69$) male and 63.5% ($n = 120$) female. The student group consisted of 41 men (32.5%) and 85 women (67.5%) while the faculty staff group consisted of 28 men (44.4%) and 35 women (55.6%). Participants ranged in age from 17 to 71 years, with an average age of 29.2 years (standard deviation 14.94). The student group ranged in age from 17 to 24 years with an average age of 19.7 years (standard deviation 1.16) and the faculty staff group ranged in age from 20 to 71 years with an average age of 47.4 years (standard deviation 12.33). The majority of students reported their marital status as single (96%) while 76.2% of the faculty staff reported their marital status as married. The majority (82.5%) of students and (87.3%) faculty staff identified their ethnicity as European/Pakeha.

The sample was considered representative of the University population on age, gender, ethnicity, work status and study status (P. Sandbrook, personal communication, January 20, 2004; M. Goss, personal communication, November 7, 2003).

Table 1. Participant Demographic Characteristics

	Sample (N = 194)		Students (n = 126)		Faculty Staff (n = 63)	
	Frequency	% of total	Frequency	% of total	Frequency	% of total
Gender: Male	69	35.6	41	32.5	28	44.4
Female	120	61.9	85	67.5	35	55.6
Ethnicity:						
Pakeha	159	82	104	82.5	55	87.3
Maori	6	3.1	4	3.2	2	3.2
Pacific Island	2	1.0	2	1.6	-	-
Asian	13	6.7	11	8.7	2	3.2
Other	9	4.6	5	4	4	6.3
Marital Status:						
Married	52	26.8	4	3.2	48	76.2
Single	133	68.6	121	96	12	19
Divorced	4	2.1	1	0.8	3	4.8
Work Status:						
Full time	72	37.1	15	11.9	57	90.5
Part-time	105	54.1	99	78.6	6	9.5
None	12	6.2	12	9.5	-	-
Study Status:						
Full time	115	59.3	113	89.7	2	3.2
Part-time	25	12.9	10	7.9	15	23.8
None	49	25.3	3	2.4	46	73

Measures

Self-administered questionnaire

This study employed a self-administered questionnaire distributed via an anonymous postal survey. Self-administered questionnaires ensure anonymity and are more likely than interviews to obtain honest responses from participants to potentially sensitive questions (Bradburn, 1983; Schweigert, 1994). Furthermore, Hirschi and Gottfredson (1993) have suggested, “the level of self-control itself affects survey responses” (p. 48). Piquero, MacIntosh and Hickman (2000) who found that self-control was related to the validity of survey responses have supported this suggestion. Additionally, Piquero et al. (2000) found that individuals lower in self-control responded to survey items differently than individuals who were higher in self-control. A solution to this problem would be to collect external observer reports of self-control (Hirschi & Gottfredson, 1993; Marcus, 2003; Tittle et al., 2003). However, to ensure participant anonymity and cover a wide geographical area, this solution was deemed impractical in the present study. Furthermore, the questionnaire in this study was designed to incur minimal participant response burden in an attempt to encourage participation and elicit honest responses.

The questionnaire consisted of a demographic information survey and measures assessing individual differences in relation to personality, self-control, imprudent behaviour and impulsivity (see Table 2). Self-reports may be biased by tendencies to report socially desirable behaviours and deny performing socially undesirable behaviours (Ajzen, 1988). Thus, the personality measure included a lie scale to assess a participant’s tendency to respond in a socially desirable manner. All measures were selected for brevity, theoretical embeddedness, adequate psychometric properties and previously demonstrated suitability for use with a university population. Additionally, measures were selected as being independent of one another, assessed by visually inspecting each scale for item content overlap.

Demographic information

Information regarding age, gender, ethnicity, marital status, teaching staff or student, full or part time work and full or part time study were collected (see Appendix

B). Demographic information was included to establish that the sample adequately represent the targeted University population. Although Gottfredson and Hirschi (1990) argue that individual differences in self-control are invariant across age and gender, these have been implicated as important variables in previous research (e.g., Gibbs & Giever, 1995; Pratt & Cullen, 2000). Therefore, the present study investigates possible differences between age groups and gender groups. Additionally, ethnicity was included to assess that sample groups are representative of the University population and reflective of New Zealand society.

Table 2. *Summary of Measures*

Measure	Author(s)	Components assessed
<i>Demographic Information</i>		Age, Gender, Ethnicity, Marital status, University affiliation, work status, study status
<i>Personality (EPQR-A)</i>	Francis et al. (1992)	Extraversion, Neuroticism, Psychoticism, Lie scale
<i>Self-control (GRAS)</i>	Grasmick et al. (1993)	Impulsivity, Simple Tasks, Risk Seeking, Physical Activities, Self-centeredness, Temper
<i>Impulsivity (DII)</i>	Dickman (1990)	Functional impulsivity, Dysfunctional impulsivity
<i>Imprudent behaviours (RBS)</i>	Marcus (2003)	School misconduct, property deviance, substance use, physical aggression, wastefulness, absenteeism/tardiness, traffic violations, social problem behaviours

Personality

The selection criteria for a personality measure were that it should be brief, theoretically compatible with GTC, psychometrically adequate, and readily and freely available. The Eysenck (1990) personality scales are the outcome of years of development and thousands of psychometric and experimental studies, conducted in various countries (e.g., Francis et al., 1992; Revelle, 1997). Furthermore, Eysenck (1977) remains one of the few psychologists to have developed and investigated a

general theory of crime based on personality traits. However, due to length the Eysenck Personality Scales (EPS) (Eysenck & Eysenck, 1991) and the EPQ Revised-Short form (EPQR-S) (Eysenck, Eysenck & Barrett, 1985) were deemed unsuitable for use in a self-administered postal survey investigating low self-control.

Francis, Brown & Philipchalk (1992) developed the Eysenck Personality Questionnaire Revised – Abbreviated (EPQR-A) (see Appendix C) as a shortened form of the (EPQR-S) (Eysenck et al., 1985). Reliability and validity coefficients of the EPQR-A scales are adequate and minimal time is required for administration.

The EPQR-A is a 24-item questionnaire comprising four scales that tap the dimensions of Extraversion, Psychoticism, Neuroticism and a Lie scale. Six items scored on a dichotomous “Yes (1) or No (0) scale assess each dimension. Negatively worded items are first reverse scored. Thereafter, for each personality dimension scale, responses are summed to give a score range of zero to six, higher scores indicating higher levels of the personality trait. Examples of the items are - Neuroticism (“Do you often feel lonely?”), Extraversion (“Do other people think of you as being very lively?”), Psychoticism (“Do you prefer to go your own way rather than act by the rules?”), and Lie scale (“Do you always practice what you preach?”).

Francis et al. (1992) administered the Eysenck Personality Questionnaire (EPQ) (Eysenck & Eysenck, 1975) and the EPQR-S (Eysenck et al., 1985) to undergraduate students in England, Canada, America and Australia. Item total correlations for each of the four EPQR-S scales across each sample group were computed. From these studies, six items from each scale with the highest correlation were selected to constitute the EPQR-A (Francis et al., 1992).

Although reliability coefficients for the EPQR-A scales are lower than the longer scales from which they were derived, Francis et al. (1992) recorded alpha coefficients between 0.74 and 0.84 for the Extraversion scale, 0.70 and 0.77 for the Neuroticism scale, and 0.59 and 0.65 for the Lie scale. However, the EPQR-A Psychoticism scale is problematic in that the alpha coefficients ranged between 0.33 and 0.52.

Psychoticism is a more recent addition to Eysenck's model of personality and earlier measures have suffered a variety of psychometric faults (Block, 1977). Furthermore, items on the Psychoticism scale have invariably attracted low endorsement in general population samples, further complicating item selection (P. Barrett, personal communication, September 2, 2004). However, the EPQR-A 6-item Psychoticism scale is no less reliable than the 12-item EPQR-S (Eysenck et al., 1985) scale. Furthermore, psychoticism is not expected to feature strongly among a university population.

Francis et al. (1992) report correlations between the EPQR-A scales and the EPQR-S scales as satisfactory, ranging from +0.80 through +0.95. Similarly, correlations between the EPQR-A Extraversion, Neuroticism and Lie scales and the longer EPQ scales range from 0.84 through +0.90. Therefore, the EPQR-A scales are considered a functional equivalent of the EPQR-S and the longer EPQ and thoroughly mirror the Eysenck personality dimensions. Furthermore, inter-correlations and partial correlations between the EPQR-A scales follow a similar pattern to that of the EPQR-S scales (Francis et al., 1992). There is a pronounced tendency for Extraversion to be negatively correlated with Neuroticism, Psychoticism is slightly positively correlated with Extraversion and Neuroticism, and the Lie scale is independent of the other three scales (Francis et al., 1992).

Similar psychometric properties for the EPQR-A have been found in research with Northern Irish undergraduate university students (Forrest, Lewis & Shevlin, 2000; Shevlin, Bailey & Adamson, 2002), Hebrew speaking students in Israel (Katz & Francis, 2000), and Czechoslovakian subjects aged 14 to 79 years (Jiri, 2001). Shevlin et al. (2002) supported the unidimensionality of the EPQR-A scales, concluding that individual items were good measures of their latent factor. Furthermore, the Eysenck (1990) personality dimensions suggest gender differences, which have been interpreted as support for the physiological basis of personality. Forrest et al. (2000) extended these findings to the EPQR-A by showing that males score higher on Psychoticism, females score higher on Neuroticism and the Lie scale and there are no significant differences for Extraversion. However, Shevlin et al. (2002) have suggested that gender differences on Neuroticism and Psychoticism might reflect socially learned behaviour (sex-role)

rather than biological differences (sex), whereas for Extraversion the contribution from sex and sex-role are similar.

In the present study, Cronbach's alphas for the Extraversion and Neuroticism scales were satisfactory at $\alpha = .82$ and $\alpha = 0.73$, respectively. Although weaker, the Lie scale showed acceptable reliability for a six-item scale at $\alpha = 0.61$. However, the Psychoticism scale proved problematic with $\alpha = 0.31$. Nevertheless, the current alpha coefficients are similar to previous research and further discussion follows in the "Results" section (see Table 3).

Self-control

The Grasmick, Tittle, Bursik & Arneklev (1993) self-control scale (GRAS) was chosen because its development was an explicit attempt to operationalise the multi-faceted construct of self-control as defined by Gottfredson and Hirschi (1990) in their General Theory of Crime. Furthermore, the widespread use of the GRAS has established it as the most popular measure of self-control as defined in GTC (Pratt & Cullen, 2000).

The GRAS is a 24-item questionnaire comprising six sub-scales that measure the components of self-control as defined by Gottfredson and Hirschi (1990) (see Appendix D). Each sub-scale comprises four items tapping the six components of self-control on a 4-point Likert-type response scale ranging from (1) "strongly disagree" to (4) "strongly agree". All items in the GRAS are worded positively therefore, higher scores indicate lower self-control. In addition to calculating a total scale score, sub-scale scores are computed by summing their respective items.

Grasmick and colleagues (1993) interpretation of Gottfredson and Hirschi's (1990) definition of low self-control led to the identification of six components which correlate to form a unidimensional construct. Examples of the items are: (1) Impulsivity, "I often do whatever brings me pleasure here and now, even at the cost of some distant goal"; (2) Simple Tasks, "I frequently try to avoid projects that I know will be difficult"; (3) Risk Seeking, "sometimes I will take a risk just for the fun of it"; (4) Physical Activities, or Physicality, "I like to get out and do things more than I like to read or contemplate ideas"; (5) Self-Centered Orientation, "I try to look out for myself first,

even if it means making things difficult for other people”; and (6) Temper, “I lose my temper pretty easily”.

The GRAS has become one of the most extensively used in empirical studies of GTC (e.g., Flora et al., 2003; Longshore, Turner & Stein, 1996; Marcus, 2003; Pratt & Cullen, 2000; Tittle et al., 2003). Consistent with GTC, the six categories correlate sufficiently with each other to be construed as indicators of a single latent construct, self-control. In the Grasmick et al. (1993) study with a simple random sample of adults (18 and older) in Oklahoma City, the internal consistency reliability (Cronbach’s alpha) for the 24-item scale was found to be $\alpha = 0.81$. Similar reliabilities have been reported in studies with a sample of adolescents, $\alpha = 0.91$ (Flora et al., 2003); drug-using criminals, $\alpha = 0.80$ (Longshore et al., 1996); adults $\alpha = 0.82$ (Tittle et al., 2003); and university students $\alpha = 0.79$ (Romero et al., 2003). In the present study, a Cronbach’s alpha of $\alpha = 0.74$ was found (see Table 3 in the Results section).

Imprudent behaviour

The selection criteria for a measure considered a scale that captured a wide variety of imprudent behaviours generally accessible to most people and independent of crime. Additionally, the scale should be applicable across different age and gender groups, suitable for use with a university population and theoretically compatible with Gottfredson and Hirschi’s (1990) self-control theory. Marcus (2003) developed the Retrospective Behavioral Self-control scale to measure self-control as defined in GTC. Marcus (2003, 2004) argued that attitudinal scales fail to assess behaviours from which Gottfredson and Hirschi’s (1990) theory was deduced. As such, Marcus (2003) developed his scale of imprudent behaviour, a scale comprising “67 strictly behavioural statements assessing the frequency of prior conduct with long-term negative consequences” as an attempt to solve the GTC self-control measurement problem (p.675).

In its development, Marcus (2003) employed the Retrospective Behaviour Scale with two German groups - undergraduate university students and predominantly male employees of a small industrial company. Cronbach’s alphas were respectively, $\alpha = 0.91$ and $\alpha = 0.95$. A re-test coefficient for the scale was .89 at a 5-month follow-up interval. Concerning gender effects, women evidenced higher levels of self-control

across all content categories except Social problem behaviour and the scale proved to be uncorrelated with age. Furthermore, the scale indicated an impressive effect size of .63 with deviant workplace behaviours (Marcus, 2004). In terms of relationships to other personality constructs and internal structure, Marcus (2003) found that his imprudent behaviour scale measured something substantially different from the Grasmick et al. (1993) self-control scale. These findings suggest satisfactory reliability in terms of internal consistency and retest stability for the Marcus (2003) Retrospective Behaviour Scale. In the present study, Cronbach's alpha was $\alpha = 0.75$ for the RBS (see Table 3 in the Results section).

However, with due consideration for the participant sample and the need for brevity, a shortened, 21-item imprudent behaviour scale (RBS) was developed for use in the present study (see Appendix E). Shortening the scale, either by using specific parts or constructing a scale based on the published item-total correlations, was considered acceptable (B. Marcus, personal communication, November 3, 2003). Therefore, heeding the caution that the quality of measurement depends on the diversity of the behavioural categories assessed (B. Marcus, personal communication, November 3, 2003), items from each of the eight imprudent behaviour categories with the highest item-total correlations were selected for the new 21-item scale (RBS). Furthermore, considered as having greater face validity with the present sample, only items from the youth (aged between 14 and 18 years) and adult (aged between 18 and 25 years) parts of the Marcus (2003) scale were selected. The RBS was considered an adequate shortened version of the original Marcus (2003) imprudent behaviour scale (B. Marcus, personal communication, November 10, 2003).

Examples of the items from the eight behaviour categories are - (1) School misconduct, "There was something else when the time came to do homework"; (2) Property deviance, "I have borrowed things and never returned them"; (3) Substance use, "In the mood, I have drunk more than I could handle"; (4) Physical aggression, "I've got physically rough when someone provoked me"; (5) Wastefulness, "On holiday, I have spent all my money before the vacation was over"; (6) Absenteeism/tardiness, "I have been late for important appointments"; (7) Traffic violation, "I drove a car or motorbike without a license"; and (8) Social problem behaviour, "I could have saved myself a lot of trouble if I had watched what I said". The

measure is scored on a 7-point Likert-type response scale ranging from (1) “never” to (7) “always”. A total scale score is computed for the RBS with higher scores indicating greater involvement in imprudent behaviours with long-term negative consequences for the actor.

Impulsivity

Previous studies of self-control have found a tendency for impulsivity and risk seeking to correlate positively with criminal and imprudent behaviours. Therefore, in the present study a measure was included to investigate impulsivity as a separate personality construct. Considerations for a measure included – brevity, theoretical embeddedness with personality theory, previously demonstrated correlation with problem behaviours, and adequate psychometric properties.

In general, impulsivity can be defined as “the tendency to deliberate less than most people of equal ability before taking action” (Dickman, 1990, p.95). Although a large body of literature espouses the negative consequences of impulsivity and suggests many techniques to reduce this trait, the consequences of impulsivity are not always negative (Dickman, 1990; Dickman & Meyer, 1988). In a series of three separate studies employing undergraduate university student samples, Dickman (1990) investigated (a) whether a self-report measure could discriminate between functional and dysfunctional impulsivity, (b) the relationships between these two impulsivity traits and various other personality measures, and (c) the relationships between these two impulsivity traits and the execution of basic information processes. The findings supported a distinction between functional and dysfunctional impulsivity and that these two tendencies form different relationships with other personality traits and the way certain information is processed (Dickman, 1990).

In an effort to clarify the nature of the personality trait of impulsivity, the late Scott Dickman (1990) distinguished between two types of impulsivity; dysfunctional and functional impulsivity. Dysfunctional impulsivity is defined as “the tendency to act with less forethought than most people of equal ability when this tendency is a source of difficulty” (Dickman, 1990, p. 95) while, in contrast, functional impulsivity is defined as “the tendency to act with relatively little forethought when such a style is optimal” (Dickman, 1990, p.95). Therefore, dysfunctional impulsivity leads to problems and

difficulty while functional impulsivity could have positive consequences. Similarly, Eysenck and Eysenck (1991) concluded that Impulsiveness (more akin to psychoticism) and Venturesomeness (more akin to extraversion) each measure a different type of impulsivity, and that Empathy (more akin to neuroticism) acts as a brake to inhibit sensation seeking. Furthermore, studies investigating specific aspects of the Extraversion personality dimension have suggested that impulsivity is most consistently associated with individual differences in information processing (Dickman, 1990; Eysenck, 1974).

Dickman's (1990) 23-item Impulsivity Inventory (DII) assesses individual differences in relation to Functional and Dysfunctional impulsivity (see Appendix F). The DII comprises 11 items tapping Functional impulsivity and 12 items tapping Dysfunctional impulsivity. The correlation between the scales is low at .22 and items converge into two separate factors (Dickman, 1990).

Dickman (1990) developed the DII as a dichotomous scale, responded to in a "Yes/No" format. However, in light of, and as discussed in the "Procedure" section, in the present study the response scale was changed from a "Yes/No" to a "True/False" format. This amendment was not considered to alter the meaning of the underlying factors nor of any individual scale items (H. Caci, personal communication, January 19, 2004). Furthermore, although a four-point rating scale (for example, "never", "rarely", "often", "always") would be preferable to analyse and reduce biases (H. Caci, personal communication, January 6, 2004), a dichotomous rating scale was employed to enable comparisons with previous studies.

For the DII, negatively worded items are first reverse scored and then scale scores are calculated by summing items. Therefore, the Functional impulsivity scale has a potential score range of zero to 11 and the Dysfunctional impulsivity scale has a potential score range of zero to 12. Examples of the items are - Functional impulsivity, "I know how to take advantage of unexpected situations where it is necessary to act quickly", and Dysfunctional impulsivity, "I often make up my mind without considering all aspects of the situation". Dickman (1990) has reported Cronbach's alphas of between 0.74 and 0.83 for the Functional impulsivity scale, and between 0.85 and 0.86 for the Dysfunctional impulsivity scale. Similar psychometric properties for the DII have been

found in studies with French nursing students (Caci, Nadalet, Bayle, Robert & Boyer, 2003) and with Flemish adults (Claes, Vertommen & Braspenning, 2000). Cronbach's alphas in the present study were, for the Functional impulsivity scale $\alpha = 0.77$, and for the Dysfunctional impulsivity scale $\alpha = 0.80$ (see Table 3 in the Results section).

Procedure

Ethics approval

An Application submitted to the Massey University Human Ethics Committee was granted approval under Protocol ALB 03/073.

Pilot study

A pilot study involved a convenience sample of four female and three male adults, age range 20 to 46 years (average age 37.3). The purpose of the pilot study was to obtain specific feedback on the questionnaire concerning clarity of instructions and of individual items, time required for completion, and ease of understanding item response requirements. Obtained feedback indicated that instructions, requirements and individual items were easy to understand and the questionnaire could easily be completed within 10 to 15 minutes. Grammatical errors and double negatives were retained as part of the original construction of individual scales. Feedback from the pilot study indicated that some items on the Dickman (1990) Impulsivity Inventory made more sense to respond in a “True / False”, rather than the original “Yes / No”, format. For example, “I don’t like to do things quickly, even when I am doing something that is not very difficult” and “I rarely get involved in projects without first considering the potential problems”. Consequently, the response format for the Dickman (1990) Impulsivity Inventory was changed from “Yes/No” to “True/False” (see Appendix F).

Obtaining Participants

Recognising that admission to a university and academic success requires a certain level of persistence and intellectual effort, there is an expectation that very few wholly unrestrained individuals would be found in a university population (Gibbs & Giever, 1995). This creates a potential bias in the present study as the sample has probably been pre-selected on higher levels of self-control. However, previous studies have found sufficient variance in university populations (e.g., Francis et al., 1992; Gibbs & Giever, 1995; Marcus, 2003; Romero et al., 2003). Therefore, students and faculty staff, while considered representative of the same population, are expected to vary sufficiently in levels of self-control, impulsivity, facets of personality and imprudent behaviours. As such, restricted variance is not considered a major problem of the present study. Further potential bias is recognised in that the sample consisted of

volunteers, students with valid email addresses and information on geographic location was not assessed. However, given the reality of research and Gottfredson and Hirschi's (1990) assertion that their theory is relative, these potential biases are not considered detrimental to the present study.

Anticipating a response rate of between 30% (Shaughnessy & Zechmeister, 1990) and 45% (Rosnow & Rosenthal, 1996), 461 questionnaires were distributed. Expecting an eventual sample of between $N = 138$ and $N = 207$, 166 young students and 295 faculty staff were targeted. Although not ideal, the expected sample size is considered adequate to reduce bias and not too large to obscure a relevant subject variable or special effect (Coolican, 1994).

A statistical power analysis determined that a sample size of 125 would be sufficient to detect an effect size of .20, with power of .60, at the .05 significance level (Rosnow & Rosenthal, 1996). Similarly, a sample size of 195 could detect an effect size of .20, with power of .80, at the .05 significance level. In their meta-analysis, Pratt and Cullen (2000) consistently found an effect size greater than .20 for self-control. Therefore, a targeted sample size of between 138 and 207 is considered large enough to detect significant effects.

Participants were asked to complete the questionnaire and return it in the reply paid envelope provided. An information sheet (see Appendix A) explained aspects of participant confidentiality, anonymity, and the right to decline to answer any particular item(s) or decline to take part in the study. Furthermore, participants were advised that the collected information would be aggregated, analysed and written up to meet the requirements of a Masters thesis. Seven weeks after the questionnaires were distributed, reminder letters were sent to all individuals on the original mailing list. Individuals were encouraged to participate, reminded to return responses before the due date and thanked if responses had already been returned. This exercise boosted the number of faculty staff participants from 25 to 59 and the number of student participants from 98 to 125.

Students. In order to protect the privacy of students, Massey University National Student Relations facilitated access to a suitable student population by sending a mass email to individuals on the University student database satisfying specific

parameters. The selection of students were considered along the following parameters - under twenty-five years of age, enrolled in the year 2003, having a valid email address, and having consented to sharing their name with other students 'for purposes related to study'. Whilst recognising the potential bias created by targeting only those students with access to a valid email address, the obtained sample compared well with the general student population (P. Sandbrook, personal communication, January 20, 2004). An email that outlined the purpose of the research and invited students to participate by contacting the researcher was sent to all students satisfying the parameters. The researcher received 166 email replies and questionnaires were posted to these students at various New Zealand and overseas locations.

Faculty staff. A random selection of academic faculty staff across the Massey University campuses at Albany, Palmerston North and Wellington was made from the Massey University internal telephone directory (2003). This entailed selecting every second person listed under the academic staff listings of the various colleges. An effort was made to target only lecturers, senior lecturers, associate professors and professors however, the directory does not specify position held and the University does not disclose personal information. Therefore, it is possible that some tutors, senior tutors, assistant lecturers, graduate assistants and research officers could also be included in the sample. However, this is not considered a negative aspect of the study as the academic faculty staff group is expected to reflect a demographically diverse population. Of the 295 questionnaires that were distributed, 81 went to Albany (27.5%), 177 to Palmerston North (60%), and 37 to Wellington (12.5%). According to Massey University Human Resources (M. Goss, personal communication, November 7, 2003), the staff head-count for July 2003 recorded 1481 academic faculty staff; 241 in Albany (16.3%), 984 in Palmerston North (66.4%) and 256 in Wellington (17.3%). As such, in the present study, the sample of faculty staff is considered representative of the University academic staff population.

Analyses

An exploration of participant demographic characteristics (see Table 1 in Method section) judged the sample representative of the targeted University population. Furthermore, participants were considered older and younger subjects of the same University population and the faculty staff group ($n = 63$) was considered too small for significant analyses. Therefore, it seemed reasonable to combine the faculty staff and student groups into one larger sample group ($N = 194$) for more robust analyses. As such, all analyses were undertaken with the students and staff combined as one group.

The analysis of data involved two processes. Firstly, the Statistical Package for Social Sciences, Version 11 (SPSS-11, 2002), was used to enter and screen data, and generate descriptive information. Secondly, confirmatory factor analyses and structural equation modeling (SEM), to test hypothesised relationships and evaluate models, were conducted with the Analysis of Moment Structures, Version 4.01 (AMOS 4.01, 1999).

Statistical analyses using SPSS-11

Raw data were entered as variables in SPSS-11, providing clear and distinctive conceptual components. The data set was then analysed for descriptive information, assumption testing, scale reliability, exploratory factor structure and correlations between the measures. Furthermore, independent samples *t*-tests were used to investigate potential differences and/or similarities between gender groups and age groups. Parametric statistical techniques were used throughout as these are considered more powerful (Landau & Everitt, 2004; Pallant, 2001). Furthermore, in the present study, the sample size was considered large enough so that minor violations of assumptions would be tolerated (Pallant, 2001).

Statistical analyses using AMOS 4.01

Firstly, the structures of the various measures were examined with confirmatory factor analysis. Models of each measure were developed and tested for adequate fit of the data. Secondly, a full SEM, a combination of path analysis and factor analysis (Klem, 2000), was employed to test hypotheses about relationships between the various

variables of self-control, impulsivity, personality and imprudent behaviour. When phenomena of interest are multi-dimensional and complex, SEM is the only analysis that allows for complete and simultaneous tests of all the relationships (Tabachnick & Fidell, 2001). Combining a measurement model with a structural model, the full SEM tests both causal relationships among unmeasured variables and the relations of unmeasured variables to measured variables (Klem, 2000).

Results

Data Entry

Coded data from the 194 completed questionnaires were entered using SPSS-11. A scoring template for the EPQR-A and DII scales was designed according to the respective scale author's instructions, this ensured accuracy and consistency of scoring and ease of correctly coding reverse scored items. Data entry was checked against the hard copies of the questionnaire and by extracting descriptive statistics for the individual scales using SPSS-11. These checks confirmed the accuracy of data entry.

Missing Data

One of the most pervasive problems in data analysis can be missing data. In particular, the pattern of missing data can be problematic and even few non-randomly missing values can affect the generalisability of the results (Tabachnick & Fidell, 2001). To ascertain the extent and pattern of missing data, SPSS-11 Missing Values Analysis (MVA) was conducted. This analysis uses univariate and multivariate statistics to establish the location and extent of missing values and determine whether the pattern of missing data could be considered random (Pallant, 2001). In the absence of any firm guidelines establishing how much missing data can be tolerated for a sample of a certain size, the guide of 5%, or less, randomly missing data is suggested (Tabachnick & Fidell, 2001).

In the present study, the percentage of missing data across all scales ranged from 0.5 to 4.6%. Furthermore, Little's MCAR test showed little significant deviation from a pattern of values that are missing completely at random, $\chi(1227) = 1315.410, p = .039$. Therefore, the SPSS-11 expectation maximisation (EM) method was used for the imputation of missing values. One questionnaire was omitted from analyses due to the amount of missing data and "bizarre" responses, leading to a sense that items were not attended to seriously. All other 193 questionnaires were used in further data analyses. Descriptive analyses were computed with both the missing data set and the EM imputed

data set. Similar results were found with both data sets, which supported the use of EM imputation.

EM is an iterative procedure comprising two steps; first, the conditional missing data is “found” based on observed values and current estimates of parameters and then a maximum likelihood estimation is performed as though the missing data had been filled in (Pallant., 2001). EM has the advantage of producing realistic estimates of variance by avoiding impossible matrices and over-fitting (Tabachnick & Fidell, 2001), and is preferred over mean substitution. All remaining analyses use the data set with EM imputed values.

Data Screening

Univariate descriptive statistics were obtained to assess accuracy of data input, out-of-range values, plausible means and standard deviations, and outliers (Norusis, 2002; Pallant, 2001). Generally, scores fell within the expected range for each measure and the few slightly out-of-range cases were found to be genuine scores. However, these did not significantly affect the overall score means as assessed by comparisons of the 5% trimmed means. Furthermore, the mean and median values were largely similar. Therefore, the slightly out-of-range cases were retained as indicating variability on measures of individual difference.

The distribution of scores on all measures indicated normal distribution while specific sub-scales indicated approximate normality, being skewed as would be expected in a non-deviant, general University population. In particular, the EPQR-A Extraversion scale, GRAS Risk Seeking sub-scale and DII Functional impulsivity sub-scale were slightly negatively skewed, indicating that most scores on these (sub-) scales were at the higher end. Similarly, the EPQR-A Psychoticism scale, GRAS Simple Tasks sub-scale and DII Dysfunctional impulsivity were slightly positively skewed, indicating that most scores on these (sub-) scales were at the lower end.

Assumption Testing

The accuracy of test interpretation depends on whether certain assumptions are violated (Coakes & Steed, 2001; Tabachnick & Fidell, 2001). The present study employed statistical tests that make certain generic and other specific assumptions. The generic assumptions explored are -

1. The scale of measurement assumption has been met because data are at the interval level of measurement.
2. The random sampling assumption has been met because data has been obtained from a convenience sample of University students and faculty staff.
3. Concerning assumptions of univariate normality, the distribution of scores across all variables was approximately normal as graphically indicated by obtained histograms and box-plots. For all measures, no potential problems were indicated because the absolute value of the skew index was not greater than a value of three nor was the kurtosis index greater than a value of 10 (Kline, 1998). Furthermore, skewness and kurtosis tend to have only a slight effect on the level of significance (Stevens, 2002).
4. Assumptions of multivariate normality follow from the approximately normal univariate distributions. Additionally, for each measure, the joint distributions of a combination of variables were found to be approximately normal and scatterplot matrices indicated sufficient linearity and homoscedasticity (Coakes & Steed, 2001; Kline, 1998; Stevens, 2002; Tabachnick & Fidell, 2001).

Internal consistency reliability analyses

Internal consistency was investigated for all measures and sub-scales to assess the item-to-item consistency of subject's responses and the extent to which items effectively measure the same underlying construct (Kline, 1998). Commonly, Cronbach's alpha coefficients are used to report scale reliability, with .70 being the accepted levels for basic research (Nunally, 1978; Tabachnick & Fidell, 2001). However, alpha coefficients can be small for short scales (Kline, 1998) and therefore, a calculation of the inter-item correlation value for scales of ten or fewer items is recommended (Nunally, 1978; Pallant, 2001). Consequently, Cronbach's alpha

coefficients (see Table 3) for all scales and sub-scales, and inter-item correlation values (see Table 4) for the shorter (sub-) scales were calculated. Based on acceptable findings, all measures were judged valid to use with the current sample and results were comparable with previous studies. For the EPQR-A and Grasmick scales, inter-item correlation values were found to be within, or exceed, the suggested optimal range of .2 to .4 (Pallant, 2001). Furthermore, the means and standard deviations were compared with possible values for each measure and values obtained in previous research. No extreme differences were found therefore, possible ceiling or floor effects, or badly skewed distributions were not considered problems in this study (Gardner, 2001).

Table 3. Cronbach's alpha coefficient, Mean and score range for all measures

	Cronbach's Alpha α		Mean (SD)	Range	Min	Max
	Present study	Other studies				
<i>Eysenck's Personality</i>						
Extraversion	.82	.74 – .84	3.52 (2.11)	6	0	6
Neuroticism	.73	.70 – .77	2.61 (1.87)	6	0	6
Psychoticism	.31	.33 - .52	1.52 (1.15)	5	0	5
Lie scale	.61	.59 – .65	2.37 (1.66)	6	0	6
<i>Grasmick Self-control</i>						
Total Scale	.74	.79 – .82	48.65 (7.65)	49	30	79
Impulsivity	.64		8.24 (2.30)	11	4	15
Simple Tasks	.79		7.46 (2.49)	10	4	14
Risk Seeking	.72		9.53 (2.50)	11	4	15
Physicality	.80		9.23 (2.85)	12	4	16
Self-centered	.69		6.20 (1.99)	8	4	12
Temper	.77		7.99 (2.93)	12	4	16
<i>Dickman's Impulsivity</i>						
Functional	.77	.74 – .83	6.10 (2.93)	11	0	11
Dysfunctional	.80	.85 – .86	3.25 (2.94)	12	0	12
<i>Marcus Behaviour Scale</i>						
Imprudent behaviour	.75	.91 – .95	44.95 (9.69)	52	22	74

SD. = Standard deviation

Table 4. *Inter-item correlation values*

	Number of items	Inter-item correlation
<i>EPQR-A</i>		
Extraversion	6	.43
Neuroticism	6	.30
Psychoticism	6	.06
Lie scale	6	.21
<i>GRAS Self-control</i>		
Impulsivity	4	.31
Simple Tasks	4	.48
Risk Seeking	4	.39
Physical Activities	4	.50
Self-centered	4	.37
Temper	4	.46

Personality scale (EPQR-A)

As expected in short scales with few items, the present study found relatively small alpha coefficients. However, these are comparable with the original EPQR-A results and previous research findings (e.g., Forrest et al., 2000; Francis et al., 1992; Jiri, 2001; Katz & Francis, 2000). Furthermore, mean and standard deviation values were similar to previous studies (e.g., Francis et al., 1992; Shevlin et al., 2002; Jiri, 2001). Additionally, results were computed for the EPQR-A with the U.K. reference sample data set that was used as the normative group for the Eysenck personality questionnaires (Barrett and Eysenck, 1992). The results based on the U.K. reference data set (P. Barrett, personal communication, September 26, 2004) were similar to the findings of the present study.

In the present study, the internal consistency reliability analysis found acceptable alpha coefficients and inter-item correlations for the Extraversion and Neuroticism scales. The alpha coefficient for the Lie scale was marginally acceptable while the Psychoticism scale proved unreliable with unacceptable internal consistency (see Tables 3 and 4). For the Extraversion, Neuroticism and Lie scales, an investigation of the item-total statistics did not indicate that the deletion of any particular items could

improve reliability. However, for the Psychoticism scale, deletion of item 3, “Would being in debt worry you?” and item 6, “Would you take drugs which may have strange or dangerous effects?”, indicated an improved alpha coefficient of $\alpha = .36$. This improvement was deemed minimal and not significant, hence the EPQR-A was retained in its original format to enable comparison with previous research.

The overall shortcomings of the EPQR-A are recognised and, in particular, it is recognised that six-items are just too few to assess a broad construct like psychoticism (P. Barrett, personal communication, September 2, 2004). Furthermore, reliability tends to be higher when the range of individual differences amongst subject’s scores is greater. Although the possible score range for the EPQR-A Psychoticism scale is zero to six, the maximum score achieved in the present study was five, with most scores being at the very low end. It is possible that the present sample contributed to the reduced magnitude of the reliability coefficient for the Psychoticism scale. The lower mean score and range suggest a low prevalence for the personality trait of psychoticism in the present sample.

However, although not optimal, the items of the Psychoticism scale do suggest a measure of a construct that is different to the other EPQR-A factors and item content reflects characteristics of psychoticism, as defined by Eysenck (Eysenck et al., 1985). The other Psychoticism scale items are – (8) “Do you prefer to go your own way rather than act by the rules?”, (12) “Do you think marriage is old-fashioned and should be done away with?”, (16) “Does it worry you if you know there are mistakes in your work?”, (22) “Is it better to follow society’s rules than go your own way?”.

Grasmick self-control scale (GRAS)

In the present study, the internal consistency for the total GRAS was found to be $\alpha = .74$. The inter-item correlations and alpha coefficients for the sub-scales were also found to be adequate, as reported in Tables 3 and 4 respectively. An investigation of the item-total statistics did not indicate an improved alpha coefficient by deletion of any particular items. Furthermore, the mean and standard deviation values were similar to those reported by Grasmick et al. (1993) in the development of the GRAS and previous research (e.g., Flora et al., 2003; Longshore et al., 1996; Tittle et al., 2003; Romero et al., 2003).

Imprudent behaviour scale (RBS)

Due to fewer items being used in the measure of imprudent behaviours, this study found a lower alpha coefficient than originally reported by Marcus (2003). However, the Cronbach's alpha of $\alpha = 0.75$ is still above the recommended reliability level of .70 (see Table 3) and item-total statistics did not reveal that deletion of any items would significantly improve the alpha coefficient. As expected, the mean and standard deviation values in this study are lower than those originally reported by Marcus (2003) however, the pattern of magnitudes is similar.

Dickman's Impulsivity Inventory (DII)

Cronbach's alpha values in this study were acceptable for both the Functional impulsivity and Dysfunctional impulsivity scales (see Table 3), respectively $\alpha = 0.77$ and $\alpha = 0.80$. Similar to Dickman (1990), the Functional impulsivity scale evidenced a slightly lower alpha coefficient than the Dysfunctional impulsivity scale. Furthermore, an investigation of the item-total statistics did not indicate a suppression of the alpha coefficient by any particular item. Mean and standard deviation values were within the expected range and similar to previous research (e.g., Caci et al., 2003; Claes et al., 2000; Dickman, 1990).

Comparative analyses of groups

Using SPSS-11, two independent-samples *t*-tests were conducted to compare scores on all measures for two age groups (17 to 24 years and 24.1 to 80 years), and for males and females (Coakes & Steed, 2001; Landau & Everitt, 2004; Pallant, 2001). The independent samples *t*-test has generic and two additional assumptions, namely, (1) independence of groups and (2) homogeneity of variance (Pallant, 2001). Participants appear in only one unrelated group; hence, the independence of groups assumption is not violated. To test for homogeneity of variance, the Levene test was conducted (Coakes & Steed, 2001; Pallant, 2001). If this test produces an *F*-ratio that is not significant at the .05 level, then it is accepted that the variation of scores for the two groups is the same and the equal variance estimates are consulted (Coakes & Steed, 2001; Gardner, 2001, Landau & Everitt, 2004; Pallant, 2001). The outcome of the Levene test determines which *t*-values to consult; equal variances assumed for significance values greater than .05 or equal variances not assumed for significance values less than .05 (Landau & Everitt, 2004; Pallant, 2001). Additionally, magnitudes of the differences between means are calculated using the information from the independent *t*-tests (Pallant, 2001).

Age groups

The data set was divided into two age groups, younger subjects of 17 to 24 years ($n = 129$) and older subjects of 24.1 to 80 years ($n = 64$). These groups are not significantly different from the student and faculty staff groups. Results of the independent-samples *t*-tests for the younger and older groups are presented in Table 5. Although statistically significant effects were found, a calculation of the effect size (Eta^2) suggests that the magnitude of the differences in means were small to moderate. Therefore, in the present study, age explained only a small percentage of the variance for all scales and sub-scales. The largest difference was found for the differences between means of Dysfunctional impulsivity where age explained 11.3% of the found variance. Based on these results, it was reasonable to conclude that the differences in scores, across all measures, for the two age groups did not explain a large percentage of the variance. The findings support Gottfredson and Hirschi's (1990) invariance hypothesis and further support the rationale of combining the student and faculty staff groups in this study. Furthermore, it is interesting to note that a significant difference in

scores for three GRAS sub-scales, (Risk Seeking, Physicality, Temper), was found although the RBS indicated equal variances.

Table 5. Comparison of scores for Age groups

	Mean (SD)		t	df	p	Eta ²
	Younger (n = 129)	Older (n = 64)				
EPQR-A Extraversion	3.84 (2.01)	2.87 (2.15)	3.09	191	.002	0.048
EPQR-A Neuroticism	2.79 (1.87)	2.23 (1.83)	1.97	191	<i>.050</i>	
EPQR-A Psychoticism	1.67 (1.21)	1.20 (.929)	2.99	159	.003	0.053
EPQR-A Lie scale	2.16 (1.63)	2.82 (1.63)	-2.65	191	.009	0.035
GRAS Total	49.8 (7.66)	46.34 (7.16)	3.02	191	.003	0.046
Impulsivity	8.4 (2.30)	7.94 (2.29)	1.30	191	<i>.196</i>	
Simple Tasks	7.48 (2.54)	7.41 (2.40)	0.18	191	<i>.861</i>	
Risk Seeking	9.88 (2.59)	8.81 (2.15)	2.85	191	.005	0.041
Physicality	9.5 (3.03)	8.69 (2.36)	2.04	157	.043	0.026
Self-centered	6.25 (1.98)	6.11 (2.00)	0.46	191	<i>.650</i>	
Temper	8.29 (3.11)	7.38 (2.43)	2.07	191	.040	0.022
RBS	45.81 (9.45)	43.20 (10.00)	1.77	191	<i>.079</i>	
DII – Functional	5.99 (2.94)	6.34 (2.90)	-0.77	191	<i>.440</i>	
DII – Dysfunctional	3.84 (3.00)	2.07 (2.43)	4.39	152	.000	0.113

Note: Nonsignificant values are presented in italics. SD = Standard Deviation; df = degrees of freedom; p = significance (2-tailed); Eta² = effect size for independent-samples *t*-test (not calculated for ns values)

Gender groups

The data set was divided into two gender groups, female ($n = 120$) and male ($n = 69$). Results of the independent-samples *t*-tests for the gender groups are presented in Table 6. Results indicated that the scores across all measures for females and males were quite similar. Although statistically significant effects were found for Psychoticism, GRAS Self-centered and DII Dysfunctional impulsivity, the magnitudes of the differences between means were small. Therefore, in the present study, gender explained only a small percentage of the variance for three particular dimensions of

individual difference while apparently not influencing the other dimensions significantly.

Table 6. Comparison of scores for Gender groups

	<u>Mean (SD)</u>		t	df	p	Eta ²
	Female (n = 120)	Male (n = 69)				
EPQR-A Extraversion	3.71 (2.10)	3.12 (2.10)	-1.89	187	<i>.061</i>	
EPQR-A Neuroticism	2.79 (1.92)	2.30 (1.78)	-1.74	187	<i>.083</i>	
EPQR-A Psychoticism	1.37 (1.13)	1.80 (1.12)	2.53	187	<i>.012</i>	0.033
EPQR-A Lie scale	2.33 (1.66)	2.45 (1.68)	0.48	187	<i>.635</i>	
GRAS Total	48.84 (6.80)	48.62 (9.02)	-0.17	113	<i>.864</i>	
Impulsivity	8.36 (2.12)	8.01 (2.62)	-0.99	187	<i>.324</i>	
Simple Tasks	7.54 (2.49)	7.29 (2.49)	-0.66	187	<i>.512</i>	
Risk Seeking	9.62 (2.53)	9.48 (2.43)	-0.37	187	<i>.714</i>	
Physicality	9.13 (2.86)	9.54 (2.80)	0.94	187	<i>.350</i>	
Self-centered	5.93 (1.86)	6.75 (2.12)	2.77	187	<i>.006</i>	0.039
Temper	8.26 (2.88)	7.55 (3.03)	-1.59	187	<i>.113</i>	
RBS	44.68 (9.21)	45.11 (10.13)	0.30	187	<i>.764</i>	
DII – Functional	5.87 (3.05)	6.47 (2.68)	1.36	187	<i>.174</i>	
DII – Dysfunctional	3.67 (2.99)	2.50 (2.70)	-2.67	187	<i>.008</i>	0.037

Note: Nonsignificant values are presented in italics. *SD* = Standard Deviation; *df* = degrees of freedom; *p* = significance (2-tailed); *Eta*² = effect size for independent-samples *t*-test (not calculated for ns values).

Correlation analyses

Based on a review of theoretical assertions and previous research, this study set out to test specific relationships between particular personality dimensions, impulsivity, aspects of self-control and imprudent behaviours, as measured by the various instruments (see Aim and general hypotheses, page 41 of this study). To calculate correlations, SPSS-11 was used but, firstly, scatterplots were generated to investigate if

the expected relationships between variables would emerge and whether these relationships were linear or curvilinear. Only variables that indicate linear relationships are considered suitable for correlation analyses and scatterplots will also indicate whether variables are positively or negatively related (Pallant, 2001; Tabachnik & Fidell, 2001).

The scales and sub-scales of the various measures comprised the variables selected to generate a scatterplot matrix. When data points form a cigar shape, with scores clumping around an imaginary straight line, a strong relationship between two variables is indicated (Pallant, 2001). The weaker the relationship the more the data points tend to spread out, in a blob-type arrangement, until no relationship is indicated by data points randomly scattered all over the graph (Brace, Kemp & Snelgar, 2000; Pallant, 2001). In the present study, the obtained scatterplots indicated moderate to strong relationships between variables that were expected to correlate and weak to no relationships between variables hypothesised as independent. Furthermore, the directions of relationships were as expected with positive correlations indicated by data points gathering around a line that pointed upwards to the right (Pallant, 2001). Therefore, the information obtained from the scatterplots supported the calculation of correlation statistics to investigate the significance of the hypothesised relationships.

The nature and strength of the relationship between two variables is assessed by the Pearson product-moment correlation (r) (Gardner, 2001; Pallant, 2001; Tabachnik & Fidell, 2001). Therefore, using SPSS-11 bivariate correlation analyses, a correlation matrix was generated to investigate relationships among all variables (Coakes & Steed, 2001; Landau & Everitt, 2004; Pallant, 2001). Initially, scores for the EPQR-A scales, GRAS total scale, RBS scale and DII scales were entered as variables and, because the direction of correlations could be predicted, the one-tailed probability level was selected (Gardner, 2001). Although the strengths of relationships were in the small to medium range (Pallant, 2001), the hypothesised relationships did emerge as statistically significant in the present study (see Table 7). There were significant positive correlations between Extraversion and DII Functional impulsivity, Psychoticism and DII Dysfunctional impulsivity and, between Neuroticism and GRAS, RBS and DII Dysfunctional impulsivity. There were significant negative correlations between the Lie scale, or social desirability, and the GRAS, RBS and DII Dysfunctional impulsivity.

Furthermore, there were significant positive correlations between the RBS and GRAS and, between the RBS and DII Dysfunctional impulsivity scale.

Table 7. *Correlations between measures*

	EPQ-E	EPQN	EPQP	EPQL	GRAS	RBS	DIIFUN	DIIDYS
EPQE <i>r</i>	(.82)							
<i>p</i>	.							
EPQN <i>r</i>	-.108	(.73)						
<i>p</i>	.067	.						
EPQP <i>r</i>	.028	-.062	(.31)					
<i>p</i>	.351	.195	.					
EPQL <i>r</i>	-.085	-.119	-.112	(.61)				
<i>p</i>	.119	.049	.060	.				
GRAS <i>r</i>	.183*	.213**	.175*	-.222**	(.74)			
<i>p</i>	.005	.001	.008	.001	.			
RBS <i>r</i>	.123	.198**	.296**	-.457**	.434**	(.75)		
<i>p</i>	.044	.003	.000	.000	.000	.		
DIIFun <i>r</i>	.357**	-.304**	.010	-.012	-.123	-.030	(.77)	
<i>p</i>	.000	.000	.443	.433	.340	.340	.	
DIIDys <i>r</i>	.208**	.209**	.174*	-.218**	.554**	.457**	.022	(.80)
<i>p</i>	.002	.002	.008	.001	.000	.000	.379	.

Note: ** Correlation is significant at the 0.01 level, one-tailed. * Correlation is significant at the 0.05 level, one-tailed. *N* = 193 in all instances. Cronbach's alpha coefficients are presented in parenthesis. EPQE = Extraversion, EPQN = Neuroticism, EPQP = Psychoticism, EPQL = Lie scale, GRAS = Grasmick self-control scale, RBS = Imprudent behaviour scale, DIIFun = Functional impulsivity, DIIDys = Dysfunctional impulsivity.

The investigation of specific relationships between the six components of the GRAS self-control measure and all other variables proceeded. Generally, the expected relationships were indicated as significant in the present study (see Appendix G). For the Extraversion scale, the strongest significant positive correlations were indicated with GRAS Risk Seeking ($r = 0.422$, $N = 193$, $p < 0.01$, one-tailed) and with GRAS Physical Activities ($r = 0.302$, $N = 193$, $p < 0.01$, one-tailed). For the Psychoticism scale, the strongest significant positive correlations were indicated with GRAS Risk Seeking ($r = .215$, $N = 193$, $p < 0.01$, one-tailed) and with GRAS Impulsivity ($r = 0.179$, $N = 193$, $p < 0.05$, one-tailed). For the Neuroticism scale, the strongest significant positive correlations were found with GRAS Temper ($r = 0.352$, $N = 193$, $p < 0.01$, one-tailed) and with GRAS Simple Tasks ($r = 0.233$, $N = 193$, $p < 0.01$, one-tailed). For the RBS, the strongest significant positive correlations were found with GRAS Impulsivity ($r =$

0.399, $N = 193$, $p < 0.01$, one-tailed), GRAS Self-centered ($r = .314$, $N = 193$, $p = 0.01$, one-tailed) and GRAS Temper ($r = 0.273$, $N = 193$, $p < 0.01$, one-tailed). For the DII Functional impulsivity scale, the strongest significant positive correlation was found with GRAS Risk Seeking ($r = 0.250$, $N = 193$, $p < 0.01$, one-tailed), while significant negative correlations were found with GRAS Simple Tasks ($r = -0.332$, $N = 193$, $p = 0.01$, one-tailed) and GRAS Temper ($r = -0.276$, $N = 193$, $p < 0.01$, one-tailed). For the DII Dysfunctional impulsivity scale, the strongest significant positive correlations were found with GRAS Impulsivity ($r = 0.577$, $N = 193$, $p < 0.01$, one-tailed), GRAS Temper ($r = .379$, $N = 193$, $p = 0.01$, one-tailed) and GRAS Simple Tasks ($r = 0.212$, $N = 193$, $p < 0.01$, one-tailed).

As hypothesised, the least effective relationship was found between GRAS Physical Activities and RBS. However, the expected relationships between GRAS Self-centered and Psychoticism and GRAS Temper and Psychoticism did not emerge. Furthermore, an unexpected negative correlation was found between GRAS Simple Tasks and Psychoticism ($r = -0.138$, $N = 193$, $p = <0.05$, one-tailed). However, inspection of the pattern of correlations suggest that GRAS Impulsivity is more associated with Psychoticism, RBS imprudent behaviours and DII Dysfunctional impulsivity whereas GRAS Risk Seeking is more associated with Extraversion and DII Functional impulsivity.

Partial correlation analyses were conducted to control for the effects of age, gender and social desirability (Coakes & Steed, 2001; Gardner, 2001; Pallant, 2001; Tabachnik & Fidell, 2001). The obtained correlation matrices indicated that the strength and direction of relationships were similar to those previously found. Therefore, in the present study, it is reasonable to conclude that subjects responded honestly and that age and gender effects did not distort results.

Factor analyses

Factor analysis can be used to “inform evaluations of score validity”, “develop theory regarding the nature of constructs” and “summarize relationships in the form of a more parsimonious set of factor scores that can then be used in subsequent analyses” (Thompson, 2004, p.4). Therefore, the basic principle underlying factor analysis is that a latent variable, or factor, accounts for the observed relationships among variables and the purpose of factor analysis is to uncover this (Gardner, 2001; Pallant, 2001). The two basic approaches are exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Thompson, 2004). EFA seeks to uncover dimensions underlying the relationships among indicator variables (Pallant, 2001) and does not require the researcher to have a priori expectations regarding the nature, or number, of underlying factors (Thompson, 2004). On the other hand, CFA presumes the invocation of specific a priori expectations (Thompson, 2004). In the presence of theory, CFA models the nature of the dimensions and seeks to determine the extent that they explain the relationships among the variables (Byrne, 2001; Gardner, 2001).

Exploratory factor analyses (EFA)

SPSS-11 exploratory principal component analysis (PCA) was used to investigate the common factors that would obtain with the sample in the present study and to compute factor pattern coefficients for all measures. Additionally, results from PCA were compared with those obtained with principal axes factoring (PAF). In PAF, the obtained correlation of each item is reduced to an estimate of communality while in PCA it is taken at face value (Landau & Everitt, 2004). Although the mathematical solution underlying both approaches is similar, PAF is concerned with only analysing the variance that is common to the variables, whereas PCA is concerned with analysing all the variance associated with the variables (Gardner, 2001). As both procedures produced very similar results, only the PCA results are reported here.

Although large samples are recommended for robust EFA (Pallant, 2001; Tabachnick & Fidell, 2001), component saturation is a more important factor to consider (Stevens, 2002; Thompson, 2004). As such, Tabachnick and Fidell (2001) recommend an inspection of the correlation matrix for evidence of coefficients greater

than .30. In the present study, the sample size of 193 falls within the recommended size of 100 to 300 subjects (Gardner, 2001). Furthermore, an inspection of the initial correlation matrix for each measure indicated sufficient coefficients greater than .30. Indeed, for all measures, coefficients in the range .30 to .82 were found. Furthermore, Bartlett's test of sphericity produced Chi-square values that were all significantly below the recommended .01 level and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was greater than .500 in all instances (.667 to .805) (Nunally, 1978; Tabachnick & Fidell, 2001).

These findings indicated that common factors account for the observed correlations among variables comprising each measure and thus support the appropriateness of conducting EFA. Furthermore, obtained factor solutions were similar to the originally proposed theoretical structure of each measure. Following satisfactory initial factor matrices for each measure, the number of factors to extract was set according to the underlying theory and number proposed by each scale author. Thus, the EPQR-A was forced into four factors which explained 41.04% of the variance, the GRAS into six factors which explained 60.03% of the variance, the RBS into eight factors which explained 61.72% of the variance and the DII into two factors which explained 33.93% of the variance.

To provide a more parsimonious description of the relationships among the variables, two rotation procedures were employed - varimax rotation, an orthogonal rotation technique assuming independent underlying factors, and oblimin rotation, an oblique rotation technique assuming relationships among factors (Gardner, 2001; Landau & Everitt, 2004; Pallant, 2000). Orthogonal solutions are easier to interpret because the rotated factors retain the independence of the factors that characterised the original PCA whereas oblique solutions allow the factors to be correlated with one another (Gardner, 2001). As such, varimax rotation was used to interpret factor solutions obtained in the present study. Furthermore, individual item factor loadings were investigated to determine if any items loaded onto the wrong theoretical factor, loaded higher on a factor other than their theoretical target or did not load specifically on any factor. However, no amendments to the measures were made based on this information thus enabling comparison with previous research.

EPQR-A. Findings for the EPQR-A in the present study are similar to those originally reported by Francis et al. (1992) and mirror the pattern of inter-correlations between the scales of the EPQR-S (Eysenck et al., 1985). A four-factor solution identified the underlying factors by the items intended to measure them and adequately explained the relationships between individual items (see Table 8). Although some items tended to load onto more than one factor, these loadings made theoretical sense and the items did still have a higher loading on their target factor. However, the Psychoticism scale proved problematic in that some items tended to cross-load onto the other more homogenous scales and two items did not load well onto their target factor. In particular, item 3 “Would being in debt worry you?”, negatively loaded onto the Neuroticism factor and not onto Psychoticism and item 6 “Would you take drugs which may have strange or dangerous effects?”, had a weak loading onto Psychoticism. Similarly, previous studies with the longer EPQ have demonstrated that Psychoticism is not a very homogenous construct with a tendency for items to cross-load onto the other scales of Extraversion, Neuroticism and Lie (P. Barrett, personal communication, September 2, 2004).

Furthermore, the pattern of inter-correlations between the scales in the present study are similar to those reported by Francis et al. (1992) and found in previous studies (e.g., Forrest et al., 2000; Shevlin et al., 2002; Katz & Francis, 2000; Jiri, 2001). Although all at a non-significant level, Extraversion negatively correlated with Neuroticism (-.11), Psychoticism evidenced a slight positive correlation with Extraversion (.03) and the Lie scale was independent of the other three scales. However, contrary to Francis et al. (1992), in the present study a slightly negative correlation between Psychoticism and Neuroticism was found (-.06). Although Francis et al. (1992) report a slight tendency for a positive correlation between Psychoticism and Neuroticism, their results show that this is the case with their English sample only. Similar to the present study, a slight negative correlation is found with their American sample.

Furthermore, current results are similar to those found for the EPQR-A with the U.K. reference data set used for the EPQ (Barrett & Eysenck, 1992). Based on the U.K. reference data set, the following correlations were found for the EPQR-A - Extraversion and Psychoticism positively correlated (.13 ns), Extraversion and Neuroticism

negatively correlated (-.12), the Lie scale was independent of the other three scales and Psychoticism very slightly positively correlated with Neuroticism (.001) (P. Barrett, personal communication, September 26, 2001).

Table 8. Matrix for a forced four-factor solution of the EPQR-A

Rotated Component Matrix^a

	Component			
	1	2	3	4
EPQR1 - N		.537		.346
EPQR2 - E	.744			
EPQR3 - P		-.336		
EPQR4 - E	.844			
EPQR5 - L		-.242	.525	
EPQR6 - P				.266
EPQR7 - L			.562	
EPQR8 - P				.658
EPQR9 - N		.702		.336
EPQR10 - L			.529	
EPQR11 - N		.587		
EPQR12 - P				.445
EPQR13 - E	.601			
EPQR14 - N		.653		
EPQR15 - E	.662			
EPQR16 - P		-.306	-.249	.336
EPQR17 - L			.656	-.218
EPQR18 - N		.700		
EPQR19 - L			.580	
EPQR20 - E	.667		-.256	
EPQR21 - N		.571		.260
EPQR22 - P				.580
EPQR23 - E	.784			
EPQR24 - L			.539	

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.

^a. Rotation converged in 5 iterations.

b. Absolute values less than .2 suppressed

GRAS. Findings for the GRAS in the present study generally support the factor structure originally proposed by Grasmick et al. (1993) (see Table 9). Items coalesced into six clusters, however, and contrary to the Grasmick et al. (1993) one-factor solution, an inspection of the scree plot and eigenvalues (Pallant, 2001; Tabachnick & Fidell, 2001; Thompson, 2004) suggested that a three-factor solution would better explain the data. This is similar to previous studies investigating the unidimensionality of the GRAS (e.g., Arneklev et al., 1999; Flora et al., 2003) and the suggestion by Marcus (2003) that the sub-scales appear to divide into three loose and three clearly superior indicators for a general construct.

Furthermore, in the development of the GRAS, Grasmick et al. (1993) found that one factor combined the Impulsivity and Simple Task items and hence proposed eliminating the Impulsivity items. Similarly, although the Impulsivity items formed a distinct factor in the current study, considerable overlap with Simple Tasks was indicated. Additionally, Impulsivity item 1, “I often act on the spur of the moment without stopping to think”, loaded highly onto Risk Seeking (.54). Furthermore, an overlap between the factors of Risk Seeking and Physical Activities and between Self-centered and Temper were found.

The inter-correlations between the sub-scales also suggested different clusters. Significant positive correlations were found between Impulsivity and Simple Tasks (.31), Risk Seeking and Physical Activities (.42), and Self-centeredness and Temper (.28). Furthermore, a significant negative correlation was found between Risk Seeking and Simple Tasks (-.34).

Table 9. Matrix for a forced six-factor solution of the GRAS

Rotated Component Matrix

	Component					
	1	2	3	4	5	6
GRAS1 - IMP					.488	.406
GRAS2 - IMP						.807
GRAS3 - IMP	.300					.574
GRAS4 - IMP	.399					.511
GRAS5 - SIMP	.778					
GRAS6 - SIMP	.703					
GRAS7 - SIMP	.681					
GRAS8 - SIMP	.778					
GRAS9 - RISK	-.370				.621	
GRAS10 - RISK					.742	
GRAS11 - RISK					.719	
GRAS12 - RISK	-.313	.326				.469
GRAS13 - PHYS		.831				
GRAS14 - PHYS		.811				
GRAS15 - PHYS		.828				
GRAS16 - PHYS		.602				
GRAS17 - SELF				.668		
GRAS18 - SELF				.690		
GRAS19 - SELF				.698		
GRAS20 - SELF				.745		
GRAS21 - TEMP			.720			
GRAS22 - TEMP			.707			
GRAS23 - TEMP			.751			
GRAS24 - TEMP			.805			

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations. b. Absolute values less than .3 suppressed

RBS. The present study found that although it was possible to identify eight components, individual items tended to load substantially on more than one factor and did not separate into distinct behavioural categories (see Table 10). An inspection of the scree plot and consideration of the large difference between eigenvalues for the first (3.75) and second (1.73) factors suggested a one-factor solution would adequately explain the relationships among variables. Similarly, in the development of the RBS, Marcus (2003) found that a general factor adequately explained relationships observed among a set of diverse behavioural indicators.

Table 10. Matrix for a forced eight-factor solution of the RBS

	Rotated Component Matrix							
	Component							
	1	2	3	4	5	6	7	8
RBS1 - PROP-Y					.721			
RBS2 - SCH-Y	.599							
RBS3 - ABS-Y	.413	.374			.368			
RBS4 - AGG-Y				.771				
RBS5 - TRAF-Y						.723		
RBS6 - SUBS-Y		.804						
RBS7 - AGG-Y				.554				
RBS8 - SOC-A		.445	.571					
RBS9 - SUBS-A		.755						
RBS10 - PROP-A							.627	
RBS11 - AGG-A				.666				.409
RBS12 - PROP-A		.304			.644			
RBS13 - TRAF-A		.347				.631		
RBS14 - SUBS-A							.731	
RBS15 - SOC-A			.815					
RBS16 - TRAF-A								.870
RBS17 - ABS-A			.319		.420			
RBS18 - WAST-A	.648							
RBS19 - SCH-Y	.457					.409		
RBS20 - WAST-A	.769							
RBS21 - SOC-A	.351		.389		.354		-.336	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 11 iterations. b. Absolute values less than .3 suppressed

DII. Findings generally support those originally reported by Dickman (1990) (see Table 11). Similar to Dickman (1990), the present study found that although an initial factor solution produced seven components with an eigenvalue equal to or greater than one, inspection of the scree plot and consideration of the large difference between the first two factors (eigenvalues = 4.20 and 3.61) and the remaining factors (eigenvalues from and below 1.35) suggested a two-factor solution would adequately explain the data. Items converged into two distinct factors clearly representative of the proposed underlying components of Functional and Dysfunctional impulsivity.

Table 11. Matrix for a forced two-factor solution of the DII

Rotated Component Matrix

	Component	
	1	2
DII1-DYS	.806	
DII2-FUN		.546
DII3-FUN		.619
DII4-DYS	.308	
DII5-FUN		.541
DII6-FUN		.622
DII7-DYS	.689	
DII8-FUN	-.318	.491
DII9-DYS	.684	
DII10-DYS	.308	
DII11-FUN		.700
DII12-FUN		.549
DII13-DYS	.516	
DII14-DYS	.503	
DII15-FUN		.497
DII16-FUN		.410
DII17-DYS	.459	
DII18-DYS	.679	
DII19-FUN		.492
DII20-FUN	-.341	.520
DII21-DYS	.699	
DII22-DYS	.488	
DII23-DYS	.399	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations. b. Absolute values less than .3 suppressed

Confirmatory factor analyses (CFA)

AMOS 4.0 was used to model and evaluate the a priori specified structure of each measure. Maximum likelihood (ML) is the standard, and most frequently used, method of estimating free parameters in SEM (Arbuckle & Wothke, 1999; Byrne, 2001). ML seeks to maximise the log of likelihood which reflects how likely it is that the observed values of the dependent variables may be predicted from the observed values of the independent variables. Furthermore, ML is not scale dependent and has been found to be quite robust even when sample size is small and data are not normally distributed (Hoyle & Panter, 1995; Kline, 1998). Following the recommendation by Hoyle and Panter (1995) the present study reports results from ML estimation in all further analyses.

Tied to the conceptual rationale of CFA as a hypothesis-testing approach to data analysis, the underlying theory of each measure decided the model to be tested for fit and validity within the present sample (Byrne, 2001; MacCallum, 1995; Thompson, 2004). In CFA, and SEM, model evaluation remains one of the most difficult and

unsettled issues (Arbuckle & Wothke, 1999). Therefore, the recommendation is that evaluation should be based on several indices that assess model fit from different perspectives (Byrne, 2001; Hu & Bentler, 1995). Furthermore, as sample size and model complexity vary so does the efficacy of estimation methods (Hoyle, 1995; Hu & Bentler, 1995; Thompson, 2004). As such, multiple fit indices from a diversity of approaches to the assessment of model fit are employed in the present study (see Table 12).

Table 12. *Description of Fit Indices*

Measure of Fit	Class	Description	Critical Values
Chi Square χ^2	<i>Inferential Index:</i> Absolute fit	Statistical test of the lack of fit resulting from over-identifying restrictions placed on a model. Although the conventional test of absolute fit, the χ^2 test is sensitive to sample size and distributional assumptions.	Low and non-significant values are desired
Goodness-of-fit Index (GFI)	<i>Descriptive fit index:</i> Absolute fit	Similar to R^2 , a measure of the relative amount of the observed covariances and variances accounted for by the model.	Values vary between 1, indicating perfect fit and 0, indicating no fit. $GFI \geq .9$ is desirable.
Root mean square error of approximation (RMSEA)	<i>Alternative fit index:</i> Based on the population discrepancy (F_0)	A measure based on residuals resulting from comparing the model-specified covariance matrix with the observed matrix.	Good fit is indicated by values less than .08 with desired values $\leq .05$. One would not want to employ a model with an $RMSEA > 0.1$.
Comparative fit index (CFI)	<i>Alternative:</i> Incremental fit index	A noncentrality index that is an improvement of the Bentler fit index; assessing model fit relative to a baseline null or independence model.	Values fall in the range from 0 to 1 with values close to 1 indicating a very good fit.
Tucker-Lewis index (TLI)	<i>Alternative:</i> Comparative fit index	Also known as the nonnormed fit index, Measures the relative improvement per degree of freedom of the target model over a baseline model.	Typically, values range between 0 and 1, with values close to 1 indicating a very good fit.

Note: (Arbuckle & Wothke, 1999; Byrne, 2001; Hoyle & Panter, 1995; Hu & Bentler, 1995; Raykov & Marcoulides, 2000).

Considering the factorial structure models for the measures in the present study, some fit indices were only marginally adequate (see Table 13) and an investigation of the modification indices indicated some error covariances and factor cross-loadings. However, the exploratory nature of post hoc model specification in order to obtain a better fit is not recommended if the model is to be based on theory and make substantive sense (Byrne, 2001; Kline, 1998; Schumacker & Lomax, 1996). Of note is the statistical significance of the Chi square (χ^2) for goodness of fit, which would indicate rejection of the hypotheses that the covariance pattern for the models approximate the observed covariance matrices (Hoyle, 1995).

However, it is commonly recognised that sample size and model complexity significantly affect χ^2 , therefore this test alone is not considered a definitive assessment of model fit (Arbuckle & Wothke, 1999; Byrne, 2001; Hu & Bentler, 1995; Kline, 1998; Schumacker & Lomax, 1996). Therefore, in the present study, the factorial structure models were judged adequate explanations of the data and the measures were considered as adequately operationalising the latent constructs they purport to measure (see Table 13). Furthermore, all models obtained similar adequate fit when applied to separate age or gender data sets.

Table 13. *Obtained Fit statistics for CFA models*

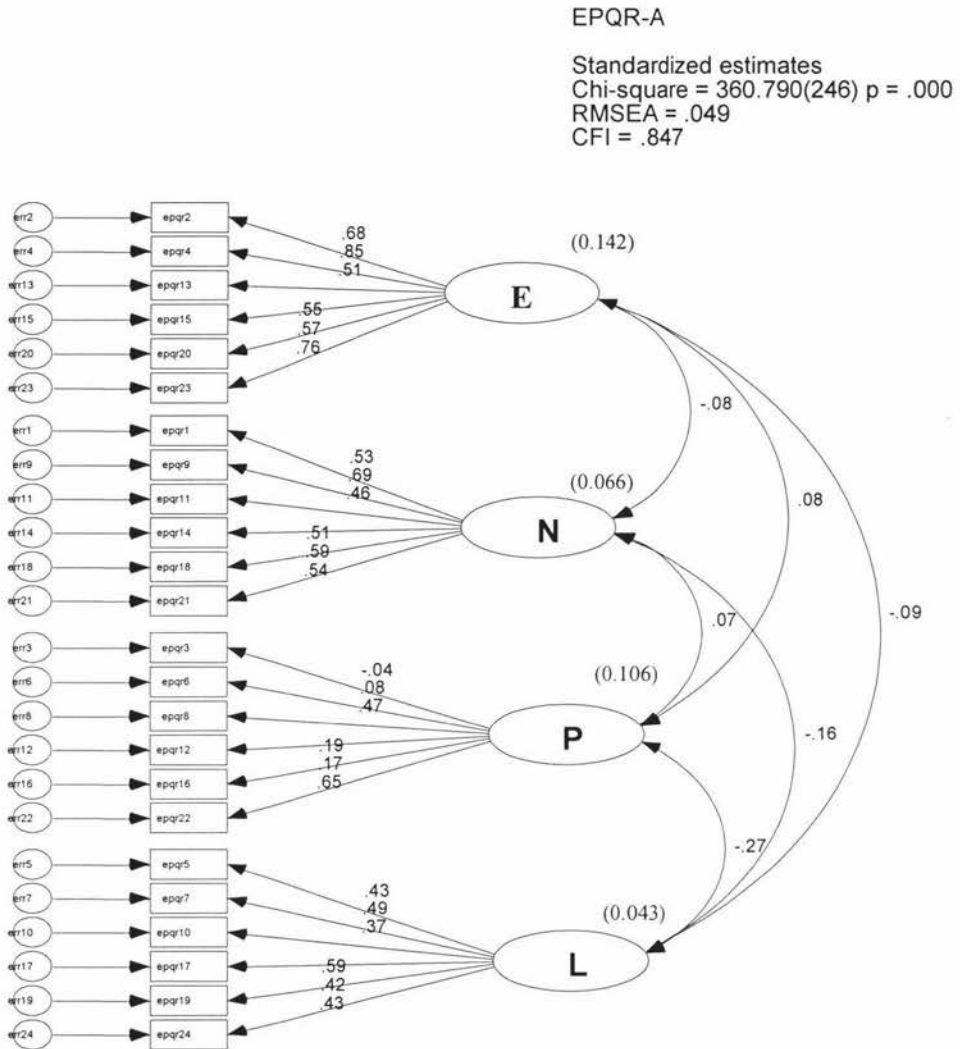
Measurement							
Model	χ^2	<i>df</i>	<i>p</i>	RMSEA	CFI	GFI	TLI
EPQR-A	360.79	246	0.000	0.05	0.85	0.87	0.83
GRAS	439.96	246	0.000	0.06	0.85	0.84	0.83
RBS	34.57	20	0.023	0.06	0.92	0.96	0.89
DII	394.22	229	0.000	0.06	0.82	0.85	0.80

Note: Degrees of freedom = *df*; probability level = *p*.

EPQR-A. Figure 3 presents the CFA model for the EPQR-A with standardised parameter estimates. The factor loadings for Extraversion (E) and Neuroticism (N) are generally greater than Kline's (1998) standard of greater than .50, suggesting that the indicators are adequate measures of the underlying factors. However, similar to EFA results, weaker factor loadings were indicated for the Lie scale (L) and the Psychoticism

(P) scale proved problematic. In particular, item 3 loaded negatively onto Psychoticism (-0.03) and item 6 indicated a very small loading (0.08).

Figure 3. 24-Item model of factorial structure of the EPQR-A



Note: Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances presented in parentheses. E = Extraversion, N = Neuroticism, P = Psychoticism, L = Lie scale.

Although the χ^2 test for goodness of fit was significant (see Table 13), alternative fit statistics for the EPQR-A were adequate. In particular, the RMSEA value (0.5) was ideal, the GFI value (0.87) was approaching the desired cut-off of .90 and, CFI (0.85) and TLI (0.83) values were within an acceptable range. Therefore, considering the fit statistics and notwithstanding the problematic Psychoticism factor, the model is accepted as an adequate explanation of the data in the present study.

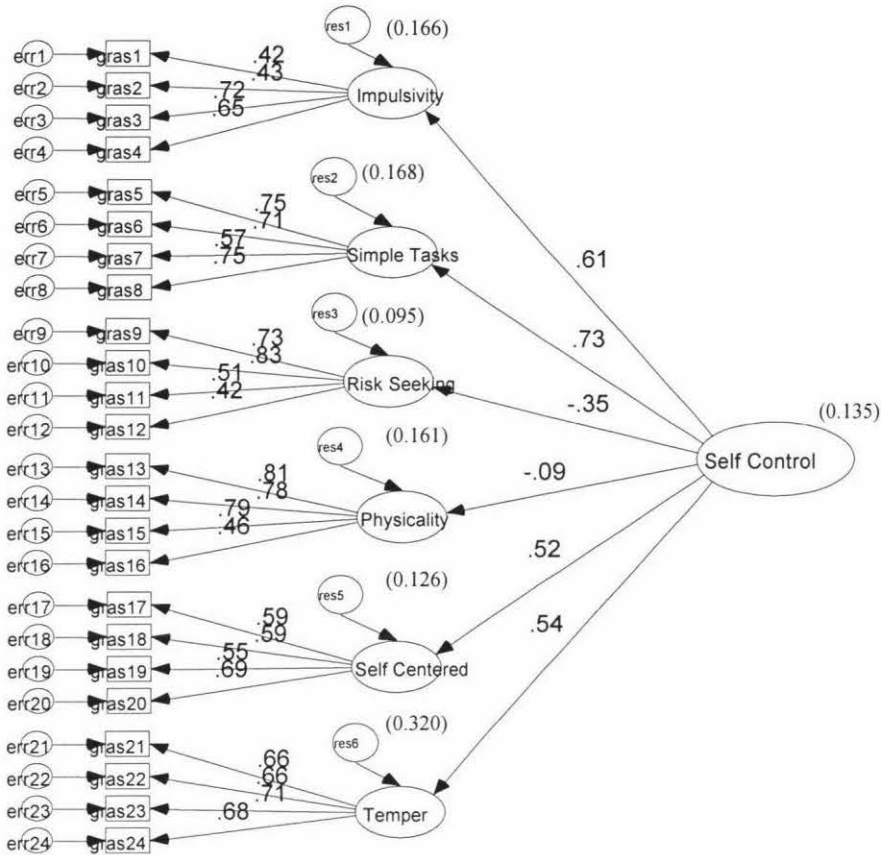
Additionally, a model of the EPQR-A measure, including Personality as a second-order factor was tested. Although similar fit statistics were obtained, the dimensions of personality are hypothesised as largely independent and the present study seeks to explore relationships among the different dimensions of personality and components of self-control, imprudent behaviour and impulsivity. Therefore, the first-order model of factorial structure was considered adequate.

GRAS. Figure 4 presents the CFA model for the GRAS with standardised parameter estimates. Factor loadings are generally greater than .50 although there is some suggestion that certain items do not measure their target factors effectively. In particular, item 1, “I often act on the spur of the moment without stopping to think”, and item 2, “I don’t devote much thought and effort to preparing for the future”, appear to be less adequate measures of the Impulsivity factor. Additionally, item 12, “Excitement and adventure are more important to me than security”, appears to be an inadequate measure of the Risk Seeking factor. Furthermore, Risk Seeking and Physical Activities do not positively load onto the latent factor of self-control. These results are similar to those obtained in previous studies (e.g., Arneklev et al., 1999; Flora et al., 2003; Grasmick et al., 1993; Romero et al., 2003).

However, fit statistics for the factorial structure model of the GRAS (see Table 13) were acceptable. Although the χ^2 test for goodness of fit was significant, alternative fit statistics approached ideal values. The RMSEA value (0.06), although not ideal was considered adequate and similar to previous studies (e.g., Flora et al., 2003; Marcus, 2003; Romero et al., 2003). Furthermore, GFI, CFI and TLI values were sufficiently large and suggested adequate model fit. Therefore, the CFA model was considered an adequate of the explanation of the data in the present study.

Figure 4. 24-Item model of factorial structure of the GRAS

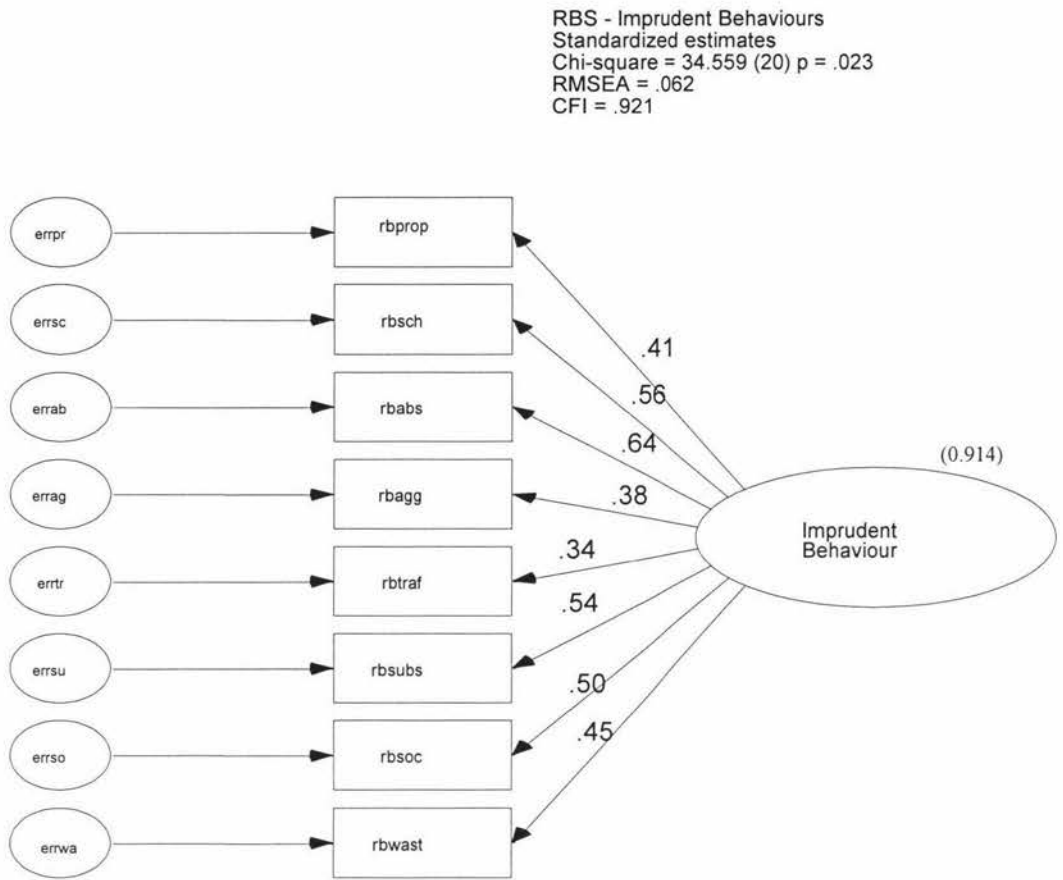
Grasmick Self-control
 Standardized estimates
 Chi square= 439.956(246) p = .000
 RMSEA = .064
 CFI = .850



Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances presented in parentheses.

RBS. Figure 5 presents the CFA model for the RBS with standardised parameter estimates. In the development of the RBS, Marcus (2003) did not operationalise self-control as comprising sub-dimensions or lower order constructs in a theoretical sense, however, he did find that the behaviour categories carried substantial specificity. As such, indicator variables for the RBS in the present study comprised behaviour categories calculated by summing the scores of their individual content items. However, the lower than ideal factor loadings (Kline, 1998) of the Property deviance, Aggression and Traffic violation categories indicated less than adequate measurement of the underlying factor of imprudent behaviour in the present sample. Nevertheless, the obtained model obtained good fit statistics (see Table 13) and was considered an adequate explanation of the data in the present study.

Figure 5. Behaviour category model of the RBS

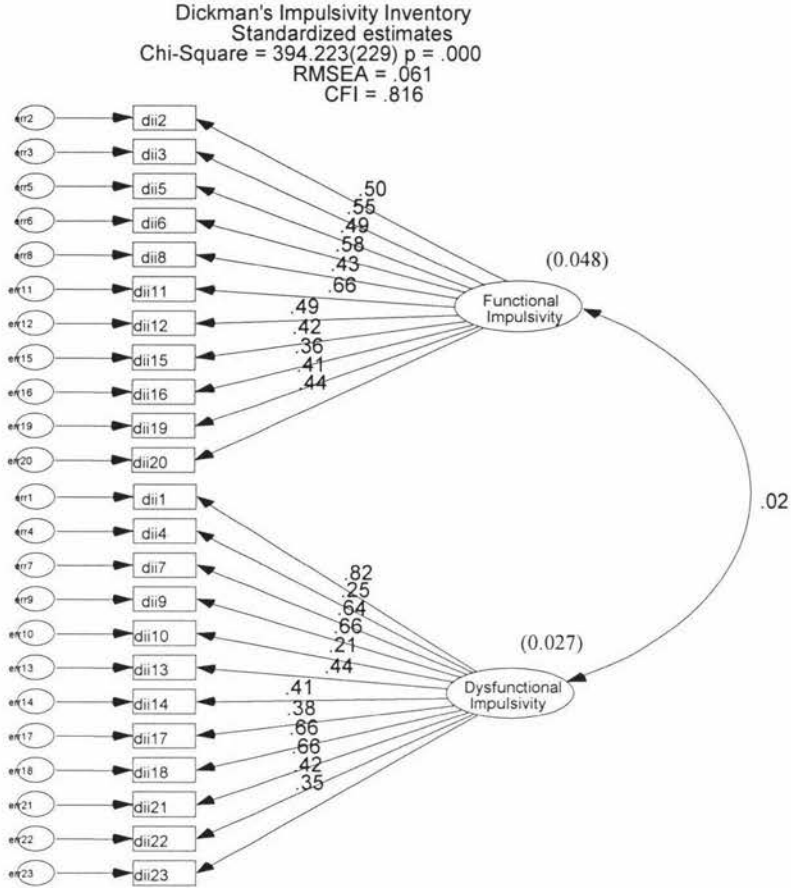


Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances presented in parentheses.

DII. Figure 6 presents the CFA model for the DII with standardised parameter estimates. Although individual item content generally appeared to reflect the underlying dimensions of Functional and Dysfunctional impulsivity, some items indicated less than ideal loading onto their target factor. Furthermore, as expected and in accordance with Dickman’s (1990) theory, the low correlation between the two factors ($r = .02$) supports the contention that Functional and Dysfunctional impulsivity are conceptually distinct types of impulsivity. Although the χ^2 test for goodness of fit was significant, alternative fit statistics were adequate (see Table 13). The RMSEA value (0.06) was within the accepted range, the GFI value (0.85) was approaching the desired value of 0.90, and the CFI (0.82) and TLI (0.80) values were adequate. Therefore, the model is considered an

adequate explanation of the data in the present study and reflects the theoretical assertions of Dickman (1990).

Figure 6. 23-Item model of factorial structure of the DII

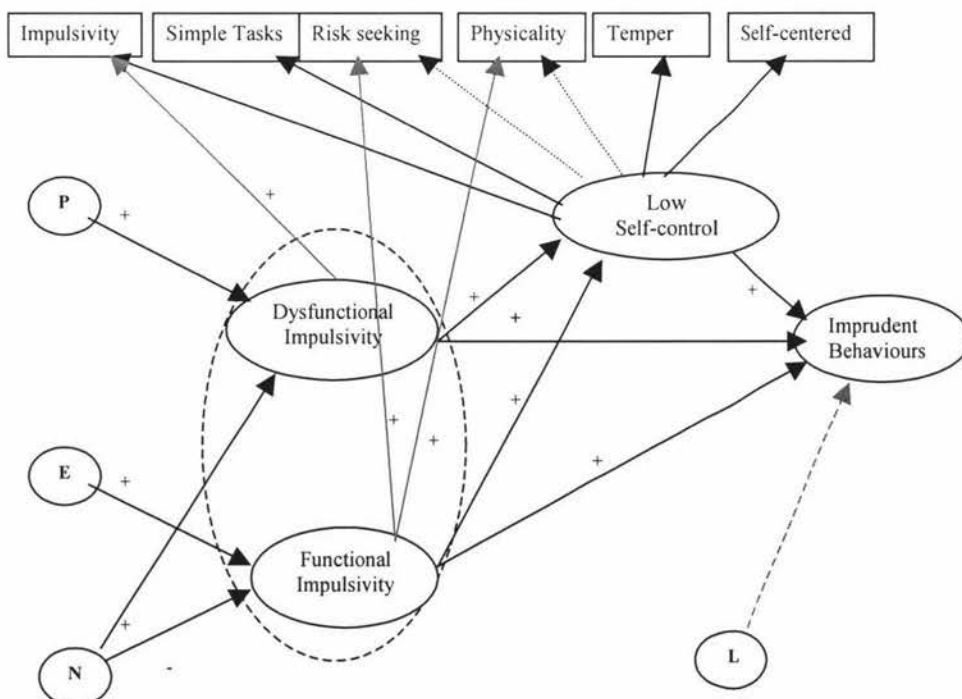


Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances presented in parentheses.

Conceptual model

Based on a review of relevant theoretical assertions and previous research, Figure 7 represents the hypothesised model of structural relations to be tested in this study. Although the depiction of Gottfredson and Hirschi’s theory in Figure 1 (see page 21 of this study) and Eysenck’s theory in Figure 2 (see page 34 of this study) indicate that opportunity moderates the impact of self-control and impulsivity, respectively, on imprudent behaviours, this relationship is not tested in the present study. Considering that the kinds of acts used as measures of imprudent behaviour in the present study are easily accessible to most people, widespread and uniformly distributed (Marcus, 2003) lead to an assumption that there would be little variation in the opportunity to commit them. Therefore, this serves as a control for opportunity by “natural variation” (Gottfredson and Hirschi, 1990, p.220) and it was considered unnecessary to include opportunity as a moderator variable to be tested. Furthermore, the influence of parental management, environmental pressure and genetic potential are not the focus of the present study and are therefore not included as variables to be tested.

Figure 7. Conceptual Model of the Personality construct of Self-control



As indicated in the conceptual model (see Figure 7), impulsivity is conceptualised as a bi-dimensional construct with Dysfunctional and Functional impulsivity operating as conceptually distinct factors. The personality variable of Extraversion (E) is expected to have a positive impact on Functional impulsivity while the personality variable of Psychoticism (P) is expected to have a positive impact on Dysfunctional impulsivity. Furthermore, the personality variable of Neuroticism (N) is expected to have a positive impact on Dysfunctional impulsivity but a negative impact on Functional impulsivity. Impulsivity mediates the relationship between the personality variables and imprudent behaviours. Furthermore, as a measure of social desirability, the Lie scale (L) will have a direct negative impact on imprudent behaviours that are regarded as socially unacceptable. This part of the model was based on the personality theory of Eysenck (1967; 1977; 1990; Eysenck & Eysenck, 1975; Eysenck & Eysenck, 1978; Eysenck et al., 1985), and the impulsivity theory of Dickman (1990).

The parsimonious self-control theory of Gottfredson and Hirschi (1990) is depicted as having a direct positive impact on imprudent behaviours. However, the six components of Impulsivity, Simple Tasks, Risk Seeking, Physicality, Temper and Self-centeredness are expected to vary in their efficiency as indicators of self-control. In particular, Risk Seeking and Physicality are not expected to be adequate indicators of self-control. This part of the model is based on previous research investigating the unidimensionality of GTC self-control (e.g., Arneklev et al., 1999; Grasmick et al., 1993; Longshore et al., 1996; Piquero et al., 2000) and exploratory investigations in the present study.

Although the measure of imprudent behaviours (RBS) is considered independent of crime per se, the acts are nevertheless regarded as socially unacceptable (Marcus, 2003) and more deviant than adventurous risk-taking. As such, Dysfunctional impulsivity and GTC self-control are expected to have a large positive impact on imprudent behaviours while Functional impulsivity is expected to have a negligible impact on imprudent behaviours. In accordance with Gottfredson and Hirschi's (1990) general theory of crime (GTC), self-control inhibits the seeking of pleasure found in criminal and analogous behaviours. Therefore, individuals with low self-control will tend to engage in criminal and imprudent behaviours. Additionally, according to

Dickman's (1990) impulsivity theory, Dysfunctional impulsivity is the tendency to act with less forethought, which is a source of difficulty and leads to problems while Functional impulsivity results in rapid performance that is optimal.

Finally, Functional and Dysfunctional impulsivity are expected to mediate the integration of personality variables and GTC self-control variables into a complete model. This part of the model draws on the few studies that have investigated the link between personality and self-control as defined in GTC (O'Gorman & Baxter, 2002; Marcus, 2003; Romero et al., 2003). Additionally, the large body of research on the structure of personality (e.g., Digman, 1990) suggests that the six characteristics of GTC self-control would be linked to independent dimensions of human character. Consequently, the following relationships are deduced from a review of the relevant literature and previous research – (1) Functional impulsivity will mediate the positive impact that Extraversion has on the GTC components of Risk Seeking and Physicality and the negligible impact that Extraversion has on GTC self-control, (2) Dysfunctional impulsivity will mediate the positive impact that psychoticism has on GTC self-control and the GTC component of Impulsivity.

In summary, while acknowledging that alternative models are possible, the conceptual model in the present study represents a version that enables the investigation of the personality construct of self-control as defined in GTC. GTC self-control is conceptualised as a unidimensional construct with the six factors of Impulsivity, Simple Tasks, Risk Seeking, Physicality, Temper and Self-centered operating as its indicators. Conceptually distinct factors of impulsivity are assumed to mediate the impact of personality variables on GTC self-control, its six indicators and imprudent behaviours. The integration of personality variables with GTC variables is generally expected to explain more of the variance, improve the measurement of self-control and enhance the prediction of imprudent behaviours.

Measurement model

In contrast to the previous CFA models of each measure that considered the extent to which individual items loaded onto their target factor, formulation of the indicator variables of a full SEM is slightly more complex (Byrne, 2001). In developing

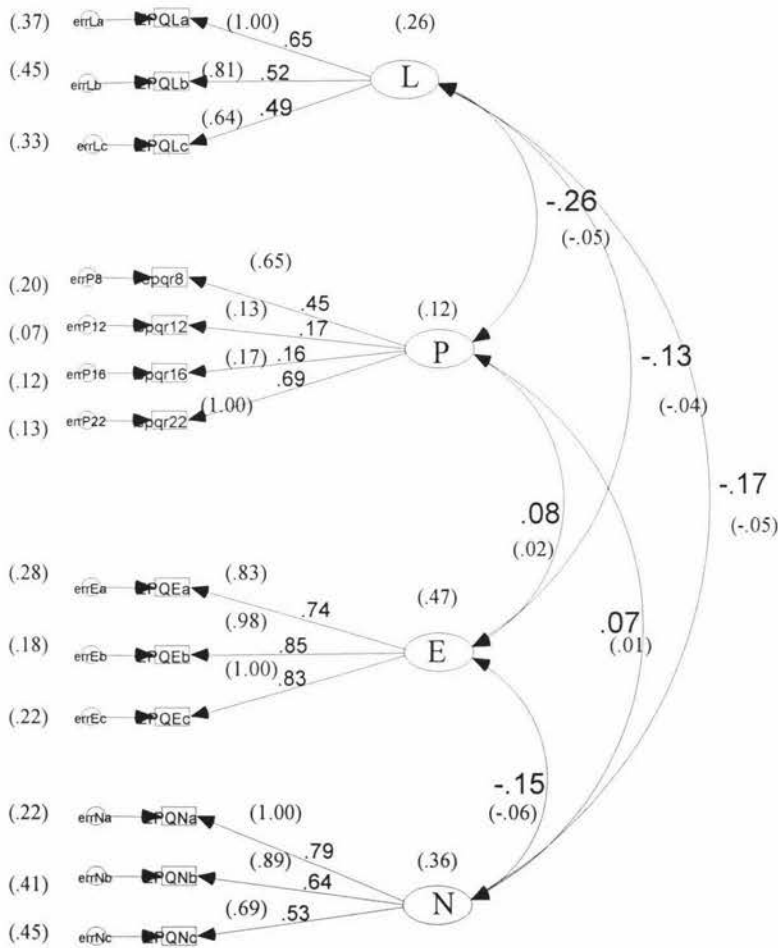
the measurement model of a full SEM it is necessary to firstly, “determine the number of indicators to use in measuring each construct” and, secondly, “to identify which items to use in formulating each indicator” (Byrne, 2001, p.144). The recommended measurement strategy for testing relationships between latent constructs is the multitrait-multimethod model (MTMM) approach proposed by Campbell and Fiske (1959) (as cited in Schumacker and Lomax, 1996). MTMM is the most widely used approach for assessing construct validity (Kline, 1995) and follows the basic logic that scores on similar tests should correlate while scores on tests that do not measure the same construct should not correlate (Schumacker and Lomax, 1996). Therefore, recognising that different methods could be used to measure any given construct, an examination of the specific factor loadings would indicate which method(s) were better at measuring the construct of interest (Schumacker and Lomax, 1996).

However, the present study employed only one measure of each construct and so indicators of the underlying constructs were formulated through the judicious combination of particular scale items into item parcels (Byrne, 2001; Gibbs et al., 2004; West, Finch & Curran, 1995). In order to equalise the measurement weighting across indicators for each construct, individual scale items were grouped according to content (Byrne, 2001) and consideration of factor loading. Additionally, where content was largely equivalent, items were randomly distributed into equivalent-item parcels (Gibbs, 2003). Item parcels are advantageous in that they typically exhibit distributions that are more normal than the original items and estimates are more stable in smaller samples because fewer parameters need to be estimated (West et al., 1995). Furthermore, given the complexity of the structural model to be tested in the present study, item parcels were considered an adequate procedure to use.

The full, hypothesised structural model, including construct indicators, is presented in Appendix H. An important first step in the analysis of SEM is to test for the validity of the measurement model. As such, the validity of the indicator variables for each construct are again tested with CFA procedures (Arbuckle & Wothke, 1999; Byrne, 2001; Mulaik & James, 1995). Therefore, a model of each measure with the newly formulated indicator variables was tested for goodness of fit. “A model is said to fit the observed data to the extent that the covariance matrix it implies is equivalent to the observed covariance matrix” (Hoyle, 1995, p. 6).

EPQR-A. For the Extraversion, Neuroticism and Lie scales, individual items were randomly distributed into three, two-item parcels. Considering the psychometric problems indicated by the Psychoticism scale, items 3 and 6 were deleted and the remaining four items were retained as indicator variables in the measurement model. Figure 8 presents the standardised estimates for the EPQR-A measurement model with 13 indicator variables.

Figure 8. Measurement model of the EPQR-A



Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances and unstandardised estimates presented in parentheses. Constrained estimates = 1.00

In reviewing the factor loadings, only the Psychoticism factor continued to indicate problems. In particular, items 12 and 16 indicated very low factor loadings (0.17 and 0.16 respectively). However, the content of these two items, respectively, “Do you think marriage is old-fashioned and should be done away with?” and, “Does it

worry you if you know there are mistakes in your work?”, appear to capture characteristics compatible with the construct of psychoticism as defined by Eysenck (Eysenck et al., 1985). Additionally, item 8, “Do you prefer to go your own way rather than act by the rules?” and item 22 “Is it better to follow society’s rules than go your own way?” capture characteristics relevant to psychoticism. Furthermore, while acknowledging that the Psychoticism factor has proved problematic throughout the present study, it was considered unwise to measure a construct with less than three indicator variables (Hoyle, 1995; Kline, 1998; Schumacker & Lomax, 1996). Therefore, items 12 and 16 were retained in the final EPQR-A measurement model.

Furthermore, all other parameters are considered statistically significant at the .05 level as indicated by critical ratio coefficients in excess of the 1.96 cutoff (Byrne, 2000; Kline, 1998). As presented in Table 14, the fit statistics for the EPQR-A measurement model indicated a very good fit to the data in the present study.

Table 14. *Obtained fit statistics for the measurement models*

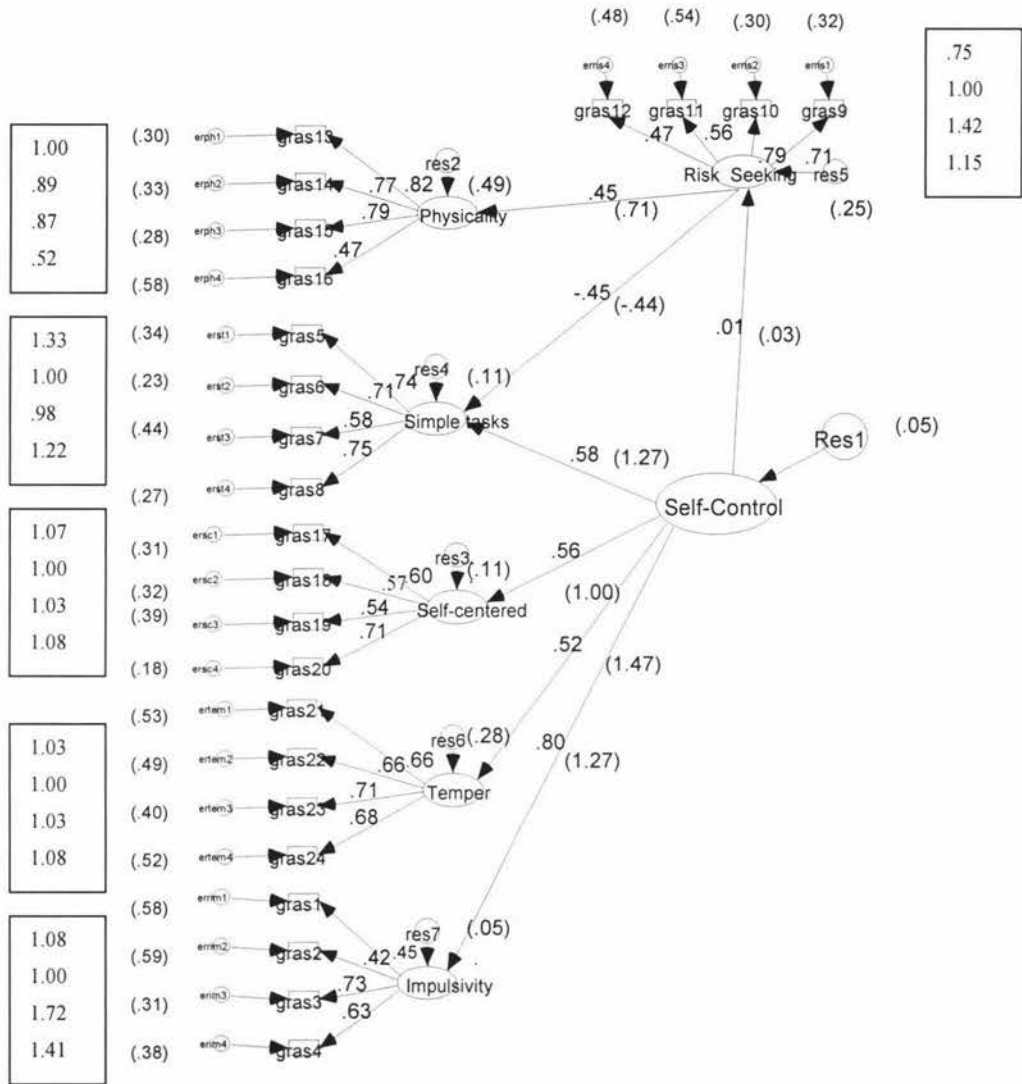
	χ^2	<i>df</i>	<i>p</i>	RMSEA	CFI	GFI	TLI
EPQR-A	70.010	59	0.155	0.031	0.974	0.950	0.965
GRAS	389.868	245	0.000	0.055	0.888	0.862	0.874
RBS	2.695	2	0.260	0.043	0.994	0.993	0.981
DII	11.886	8	0.156	0.050	0.988	0.980	0.977

Note: Chi Square = χ^2 ; Degrees of freedom = *df*; probability level = *p*;

GRAS. The GRAS is a 24-item measure with each of the six sub-scales measured by four items. In SEM, the recommendation is to have no less than three indicator variables for each construct (Hoyle, 1995; Kline, 1998; Schumacker & Lomax, 1996). Therefore it was considered prudent to retain the items comprising each sub-scale as indicators of Impulsivity, Simple Tasks, Risk Seeking, Physicality, Temper and Self-centered. However, based on results from previous studies and CFA results in the present study, paths were included to indicate the relationships between Risk Seeking with Simple Tasks and Physicality (see Figure 9). Both these paths made substantive sense as the characteristics of being physically active (GRAS Physicality) and not

daunted by challenge (GRAS Simple Tasks) appear compatible with Risk Seeking. Additionally, an investigation of the modification indexes (MI) and critical ratios (CR) supported these parameter estimates.

Figure 9. Measurement model of the GRAS



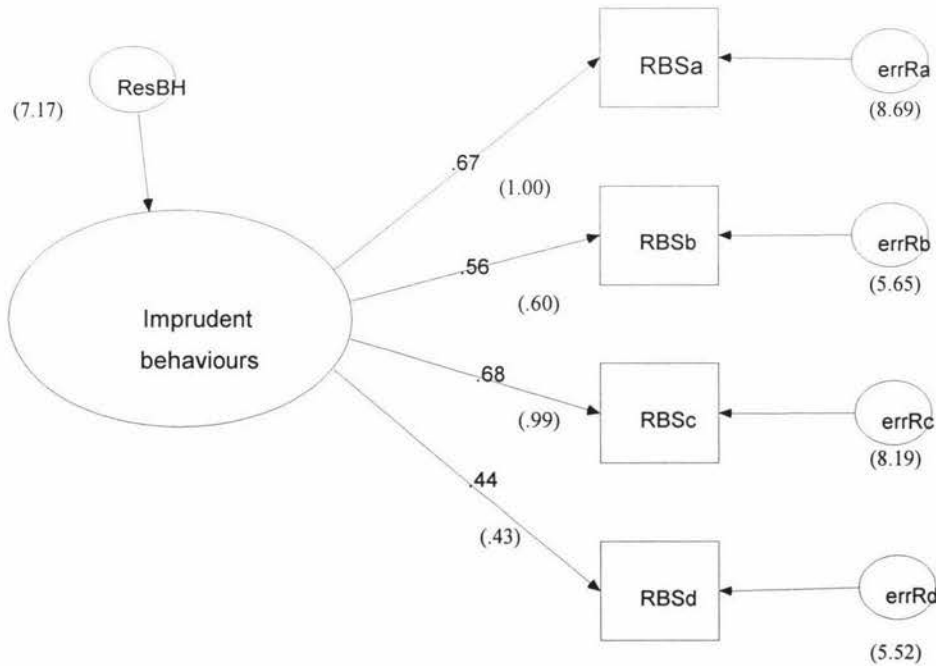
Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances and unstandardised estimates presented in enclosed boxes to the left, and for Risk Seeking to the right. Constrained estimates = 1.00

This final measurement model of the GRAS indicated all parameter estimates, except the loading of Risk Seeking onto self-control, to be statistically significant at the .05 level. Furthermore, because the measurement model of the GRAS is nested in the former CFA model of the GRAS, a direct comparison of fit statistics was possible (Byrne, 2000). Although the improvement in model fit for the measurement model

appeared trivial on the basis of fit statistics, the model difference was statistically significant as indicated by the difference of the χ^2 test for goodness of fit, $\Delta\chi^2(1, N = 193) = 54.49, p < .0001$. Therefore, the measurement model of the GRAS is considered an improved model with better fit to the data in the present study (see Table 14).

RBS. The original CFA model for the RBS tested categories of behaviour as indicated by individual scale items. In developing the measurement model for the RBS, particular categories were combined based on an investigation of item content and factor loading. As such, the categories of Social problem behaviour and School misconduct (RBSa), Property deviance and Absenteeism (RBSb), Substance use and Wastefulness (RBSc), and Physical aggression and Traffic violations (RBSd) were combined to form four indicator variables of RBS imprudent behaviours (see Figure 10). Factor loadings were adequate and all statistically significant at the .05 level. As presented in Table 14, the measurement model of the RBS indicated a very good fit to the data. The χ^2 test for goodness of fit was not significant, $\chi^2(2, N = 193) = 2.70, p = .260$, and alternative fit statistics were within the desired ideal range (RMSEA = .04, CFI = .99, GFI = .99, TLI = .98).

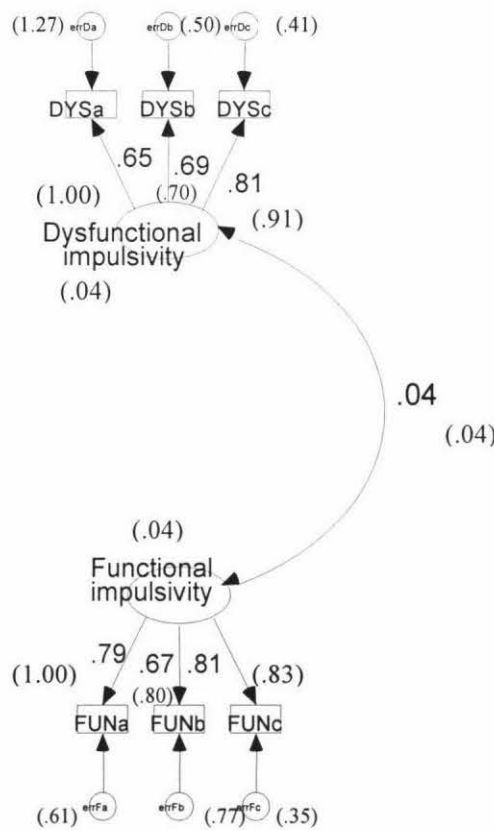
Figure 10. Measurement model of the RBS



Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances and unstandardised estimates presented in parentheses. Constrained estimates = 1.00

DII. For the Dysfunctional impulsivity scale, individual items were randomly distributed into three, four-item parcels. Functional impulsivity is an 11-item scale so two, four-item parcels and one, three-item parcel were developed as indicators (see Figure 11). Furthermore, considering the variable factor loading for individual items indicated in the original CFA for the DII, item-parcels were investigated to ensure equalised measurement weighting across indicators for each construct (Byrne, 2001). Factor loadings were adequate and parameter estimates were all statistically significant at the .05 level. The measurement model of the DII indicated a very good fit to the data (see Table 14). The χ^2 test for goodness of fit was not significant, $\chi^2 (8, N = 193) = 11.89, p = .156$, and alternative fit statistics were within the ideally desired range (RMSEA = .05, CFI = .99, GFI = .98, TLI = .98).

Figure 11. Measurement model of the DII



Note: All paths are significant at the 0.05 level. Path values are standardised estimates. Variances and unstandardised estimates presented in parentheses. Constrained estimates = 1.00

Structural Model

Hypothesised Model (Model 1). Based on the satisfactory performance of the measurement models, the next appropriate step in SEM was to test the structural model (Appendix H) (Byrne, 2000; Kline, 1998). In the hypothesised model, referred to as Model 1, constructs represented in the conceptual model are operationalised and the model is translated into the statistical manifestation that is to be tested (Hoyle & Panter, 1995). As such, Model 1 represents hypothesised relationships between the 14 personality and self-control constructs (latent variables) measured by 47 indicator variables. To fix the metric of the latent variables, one factor loading per latent variable was fixed to a value of one. Therefore, the path diagram comprised 124 regression weights with 71 fixed and 53 free to be estimated, 61 free error variances and 6 free covariances between dimensions of personality (see Appendix I). Given that there are 47 observed variables, this means that for Model 1 there would be $47(47 + 1)/2 = 1128$ data points, or sample moments, to work with. Therefore, Model is adequately overidentified with 120 parameters to be estimated from 1128 sample moments, resulting in 1008 degrees of freedom on which to base the χ^2 test. This allows for rejection of the model and thereby renders it scientifically useful (Byrne, 2000).

When alternative models are nested within the hypothesised structural model, the χ^2 test and additional fit statistics are considered important in comparing goodness-of-fit (Arbuckle & Wothke, 1999; Byrne, 2000, Schumacker & Lomax, 1996). In the present study, the two additional fit statistics considered for comparing models are the Expected cross validation index (ECVI) and the Parsimony goodness-of-fit index (PGFI). These statistics are suitable for comparing model fit because the ECVI assumes a comparison of models and the PGFI controls for the number of free parameters in competing models (Arbuckle & Wothke, 1999; Byrne, 2000). Although there are no determined appropriate ranges for these fit indexes, models indicating the smallest ECVI value are considered to have the greatest potential for replication (Byrne, 2000) and larger PGFI values indicate a better fitting model (Arbuckle & Wothke, 1999; Byrne, 2000).

To date there is no empirical or reasoned basis for the generally accepted cut-off value of .90 that has become the optimal standard indicating good fit for most fit indices (Hoyle & Panter, 1995). Furthermore, the few studies of GTC employing SEM

procedures have reported values of .80 and above to indicate acceptable fit (e.g., Longshore et al., 1996; Marcus, 2003). In reviewing Table 15, it becomes evident that by adopting the .90 cut-off value, the hypothesised model (Model 1) would indicate a poor fit to the data in the present study. However, the RMSEA value of .05 was within the recommended range of acceptability ($< .05$) and other fit statistics fall within, or close to, the .80 value. Therefore, Model 1 is considered an acceptable explanation of data in the present study.

Respecified Model (Model 2). SEM analysis rarely involves estimating a single model and the strategic choice of alternative models can strengthen support for the target model (Byrne, 2000; Jöreskog, 1974, cited in Hoyle & Panter, 1995; Kline, 1998). As such, following an inductive approach, post-hoc modifications to the target model were considered. As such, Model 1 (see Appendix I) was reviewed to ensure all parameters were correctly fixed or free for estimation, and that all paths were correctly specified and path loadings were adequate and made substantive sense. Furthermore, Model 1 indicated the hypotheses that, relative to self-control, Dysfunctional impulsivity would have a greater impact on GRAS Impulsivity and Functional Impulsivity would have a greater impact on GRAS Risk Seeking. Based on these observations and previous research suggesting that these two components perform poorly as indicators of GTC self-control (e.g., Arneklev et al., 1999; Flora et al., 2003; Grasmick et al., 1993; Romero et al., 2003), the paths from self-control to GRAS Impulsivity and GRAS Risk Seeking were deleted. Furthermore, this decision was supported by an inspection of MI and CR coefficients. Additionally, MI and CR values suggested that the path from the Lie scale to self-control and another Psychoticism item, (item 12, “Do you think marriage is old-fashioned and should be done away with?”) did not substantially contribute to the model and could be considered redundant.

Considering that the survey in the present study was anonymous and the sample were University staff and students, it is reasonable to assume that participants responded honestly and therefore, the Lie scale should not significantly affect self-control. The problematic Psychoticism scale is a weakness of the present study, and the measurement model of the EPQR-A had also indicated that item 12 contributed very little to the model. Consequently, the path from the Lie scale to self-control and Psychoticism scale-item 12, were deleted to develop the respecified model, Model 2 (see Appendix J).

Whilst model specification searches based only on the consideration of statistical information is contrary to the confirmatory nature of SEM, model respecification is appropriate in the context of theoretical and substantive defense (Byrne, 2000; Kline, 1998; Thompson, 2004). Although fit indices for Model 2 indicated a similar fit to the data compared with Model 1 (see Table 15) and the difference in χ^2 test for goodness of fit was not considered statistically significant, ECVI and PGFI values did indicate an improved fit (see Table 16). Furthermore, the respecified model made theoretical sense and was thus accepted as an improved interpretation of the data in the present study.

Table 15. *Obtained fit statistics for the structural models*

	χ^2	<i>df</i>	<i>p</i>	RMSEA	CFI	TLI	GFI
Model 1 (<i>Hypothesised</i>)	1524.87	1008	.000	0.05	0.82	0.80	0.76
Model 2 (<i>Respecified</i>)	1481.09	966	.000	0.05	0.81	0.80	0.76
Model 3 (<i>Parsimonious</i>)	1482.45	968	.000	0.05	0.82	0.80	0.76
Model 4 (<i>Independence</i>)	1706.87	1014	.000	0.06	0.75	0.74	0.73
Model 5 (<i>Impulsivity</i>)	1569.14	1013	.000	0.05	0.80	0.79	0.75

Parsimonious Model (Model 3). All parameters and paths of Model 2 were reviewed to determine their contribution to the model. MI and CR coefficients indicated that two paths were not statistically significant. Therefore, removing the paths from self-control and Functional impulsivity to imprudent behaviours would present a more parsimonious model of the data. Consequently, these paths were deleted to develop the parsimonious and final model, Model 3 (see Figure 12). Fit indices were computed and compared with Model 1 (see Table 15). Again, the difference of the χ^2 test was not statistically significant although ECVI and PGFI values indicated an improved fit to the data for Model 3 (see Table 16). Furthermore, these changes made substantive sense based on the guiding hypothesis that self-control could better be re-conceptualised as a composite of personality traits and the hypothesis that Functional impulsivity would not lead to problem behaviours. Furthermore, the matrix of standardised residual values indicated that all were well below the cut-off value of 2.58 (Byrne, 2000). Standardised

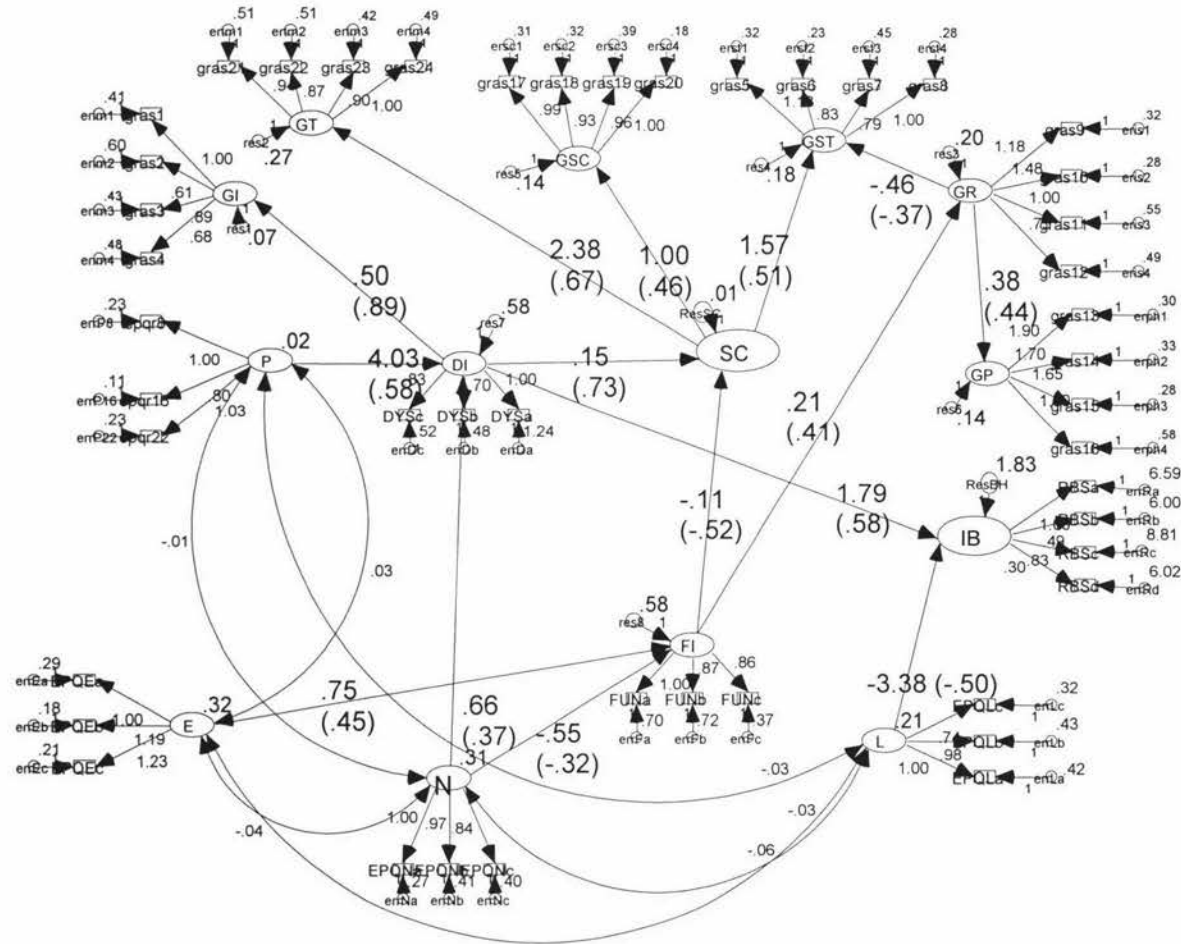
residuals are analogous to Z scores, basically representing estimates of the number of standard deviations that the observed residuals are from zero residuals that would exist if the model fit was perfect (Byrne, 2000; Jöreskog, 1993). In the present study, it was reasonable to conclude that Model 3 achieved a good fit to the data as no statistically significant discrepancy was indicated. Therefore, in the present study, Model 3 was proposed as the final model; theoretically defensible, parsimonious, statistically adequate and best fit to the data (see Figure 12).

Table 16. Comparison of fit statistics for alternative models

	χ^2	<i>df</i>	$\Delta\chi^2$	Δdf	Statistical significance	ECVI	PGFI
Model 1 <i>(Hypothesised)</i>	1524.87	1008				9.192	0.678
Model 2 <i>(Respecified)</i>	1481.09	966	43.78	42	p = .396 <i>ns</i>	8.912	0.679
Model 3 <i>(Parsimonious)</i>	1482.45	968	42.42	40	p = .367 <i>ns</i>	8.898	0.681
Model 4 <i>(Independence)</i>	1706.87	1014	224.42	46	p < .0001	10.077	0.658
Model 5 <i>(Impulsivity)</i>	1569.14	1013	86.69	45	p < .0002	9.371	0.675

Note: *ns* = not statistically significant, p = two-tailed level of power, $\Delta\chi^2$ = difference of Chi square for two nested models, Δdf = difference of degrees of freedom for two nested models.

Figure 12. Model 3, Parsimonious and Final Model



Note: All paths are significant at the .05 level. Path values are unstandardised estimates with standardised parameter estimates presented in parentheses.

GI = GRAS Impulsivity, GT = GRAS Temper, GSC = GRAS Self-centered, GST = GRAS Simple Tasks, GR = GRAS Risk Seeking, GP = GRAS Physical Activities, SC = Self-control, P = Psychoticism, DI = Dysfunctional Impulsivity, IB = Imprudent Behaviours, E = Extraversion, FI = Functional Impulsivity, N = Neuroticism, L = Lie Scale. Constrained parameters = 1.00.

Alternative Models. Kline (1998) includes the failure to consider alternative (nonequivalent) models among his list of potential mistakes in the interpretation of SEM. As such, two alternative models were specified a priori, enabling a deductive approach to make comparisons with the target hypothesised model (Hoyle & Panter, 1995).

The development of Model 4, the independence model, followed Gottfredson and Hirschi's (1990) contention that GTC is not compatible with personality traits. As such, the constructs of GTC self-control, personality variables and impulsivity were modelled as not influencing one another (see Appendix K). Model 5, the impulsivity model, was developed according to a premise deduced from reading the literature that impulsivity alone would be a strong predictor of imprudent behaviour. As such, the impacts of the components of GTC self-control and personality variables on imprudent behaviour were modelled as mediated by Dysfunctional and Functional impulsivity (see Appendix L).

Fit statistics were computed and, being nested models, comparisons were made between the two alternative models and Model 3, the model accepted in this study as the most parsimonious and best fitting model of the hypothesised relationships. The importance of consulting different kinds of fit indices (i.e., absolute fit and incremental fit) was observed and, although some fit statistics indicated relatively small differences in fit, the difference in χ^2 test for goodness of fit was statistically significant for both models (see Tables 15 and 16).

Model 3, a model of inter-relationships between components of personality and GTC self-control (see Figure 12), indicated a better fit to the data than Model 4, a model depicting independence of components (see Appendix K). This was indicated by better fit statistics for Model 3 (see Table 15) and a statistically significant difference of the χ^2 test for goodness of fit, $\Delta\chi^2 (46, N = 193) = 224.42, p < .0001$ (see Table 16). Similarly, Model 3 obtained better fit statistics than Model 5, the alternative model testing the hypothesis that impulsivity and low self-control are essentially the same and therefore did not include the latent factor of GTC self-control (see Appendix L). Although, the fit statistics for Model 3 appeared trivially better than those for Model 5, the difference was statistically significant

as indicated by the difference of the χ^2 test for goodness of fit, $\Delta\chi^2 (45, N = 193) = 86.69, p < .0002$ (see Table 16). Consequently, Model 3 is supported, both theoretically and statistically, as the better fitting model in the data in the present study.

Interpretation of Estimates

Standardisation implies that a variable has been transformed to have an average of zero and a standard deviation of one (Kline, 1998). Furthermore, standardised coefficients are easier to interpret because all variables are on the same scale of measurement and usually range from -1 to +1 (Kline, 1998; Schumacker & Lomax, 1996). In contrast, unstandardised estimates are derived with variables in their original scales and are not all limited to the same range (Kline, 1998). “Thus, unstandardised estimates cannot be directly compared across variables with different scales” (Kline, 1998, p.18).

Associated with each observed variable is an error term representing measurement error, the variable’s adequacy in measuring the underlying factor (Byrne, 2000; Hoyle, 1995). In addition, associated with each factor being predicted is a residual term representing the error in the prediction of the underlying, or endogenous, factor from exogenous factors (Byrne, 2000). Essentially, these two error terms represent unobserved variables.

As such, standardised parameter estimates correspond to effect-size estimates and are of interest when considering the adequacy of factor loadings (Hoyle, 1995). Conversely, the unstandardised regression coefficients, or regression weights, reflect the original metrics of variables and indicate the expected change in the value of the criterion variable as a function of the predictor, or indicator, variable (Kline, 1998; Schumacker & Lomax, 1996). In the present study, model diagrams for all structural models present unstandardised estimates and additionally, for factor loadings, standardised estimates are presented in parentheses.

Discussion

Aim and Purpose of the present study

This study employed measures of individual differences to investigate the personality construct of self-control as defined in Gottfredson and Hirschi's (1990) General Theory of Crime (GTC). To this end, the relationship between the six components of self-control as measured by the Grasmick et al. (1993) self-control scale (GRAS) and the three major dimensions of personality proposed by Eysenck (1967, 1977) were analysed.

The overarching aim of the present study was to investigate the plausibility of explicit connections between GTC self-control and facets of personality as measured by the Francis et al. (1992) Abbreviated form of the Eysenck Personality Questionnaire Revised (EPQR-A). Furthermore, impulsivity was investigated as a specific personality dimension comprising two conceptually distinct constructs that would mediate the impact of personality variables on self-control and imprudent behaviour. As such, the Dickman (1990) Impulsivity Inventory (DII) measured Dysfunctional and Functional impulsivity and an abbreviated form (RBS) of the Marcus (2003) Retrospective Behavioural Self-control scale measured imprudent behaviour. The investigation of specific relationships between components of GTC self-control, EPQR-A dimensions of personality, DII impulsivity variables, and RBS imprudent behaviour was guided by the broad hypothesis that the meaning of GTC self-control could better be re-conceptualised as a composite of personality traits.

The purpose of the present study was to contribute toward clarifying the nomological net, enhance the current operationalisation and improve the construct validity of GTC self-control measurement. By integrating a well-validated model of personality with the model of GTC self-control, this study attempted to broaden the understanding of individual differences observed in the tendency to engage in behaviours with long-term aversive consequences. Furthermore, this study is distinguished from previous studies of

GTC by employing SEM, one of the most useful analytical techniques currently available, to simultaneously test explicit a priori hypothesised relationships.

Expected relationships

Based on a review of the literature and research, specific relationships between components of GTC self-control, facets of personality and imprudent behaviour were hypothesised. In particular, Functional impulsivity was expected to mediate the positive association between the personality dimension of Extraversion and the GTC components of Risk-seeking and Physical Activities (Physicality). Additionally, Dysfunctional impulsivity was expected to mediate the positive association between the personality dimension of Psychoticism and the GTC components of Impulsivity, Self-centeredness, Simple Tasks and Temper. The personality dimension of Neuroticism was expected to have an inhibitory effect on Functional impulsivity and a positive effect on Dysfunctional impulsivity. Furthermore, the GTC self-control and personality variables associated with Dysfunctional impulsivity were expected to have a positive effect on imprudent behaviour while the variables associated with Functional impulsivity were not necessarily expected to influence imprudent behaviour. Consistent with the stability and generality postulates of GTC and personality theory, age and gender were not expected to have a significant influence on the hypothesised relationships in the present study.

Based on these hypothesised relationships, a model depicting the personality construct of self-control as defined in the General Theory of Crime (Gottfredson & Hirschi, 1990) was expected to produce adequate fit statistics and account for more of the variance. Furthermore, alternative models depicting either independence between components or construing impulsivity and low self-control as essentially the same construct, were expected to obtain inadequate goodness-of-fit statistics.

Findings based on the data in the present study

In the present study, the data suggest an interaction between factors of GTC self-control and different domains of personality. As such, the hypothesised relationships are generally supported and self-control, as defined in GTC, is re-conceptualised as a composite of personality variables.

In particular, significant positive correlations were indicated between Functional impulsivity and the GRAS components of Risk Seeking and Physicality, and between Dysfunctional impulsivity and the GRAS components of Impulsivity, Simple Tasks and Temper. Interestingly, although the GRAS component of Self-centeredness performed adequately as an indicator of self-control and indicated adequate inter-correlation with the other GRAS components, a weaker significant correlation was found with Dysfunctional impulsivity. Furthermore, negative correlations were indicated between Functional impulsivity and the GRAS components of Impulsivity, Simple Tasks, Temper and Self-centeredness, thereby supporting the plausibility that GTC self-control and the personality construct of impulsivity are conceptually compatible.

Considering the personality dimensions, significant positive correlations were indicated between Psychoticism and Dysfunctional impulsivity, and between Extraversion and Functional impulsivity. Furthermore, a significant positive correlation was indicated between Neuroticism and Dysfunctional impulsivity and a significant negative correlation between Neuroticism and Functional impulsivity. The relationships between personality variables with components of GTC self-control and RBS imprudent behaviours were mediated by Dysfunctional and Functional impulsivity.

Considering RBS imprudent behaviours, the strongest positive relationships were found with Dysfunctional impulsivity and the GRAS components of Impulsivity, Simple Tasks, Temper and Self-centeredness. The Lie scale negatively impacted on the RBS and a non-significant negative relationship was found between Functional impulsivity and the

RBS. Additionally, although weaker, a significant positive relationship between Neuroticism and imprudent behaviour was indicated.

Separate comparative analyses indicated that both age and gender explained only a modest percentage of the variance in the present study. Additionally, when the effects of age and gender were controlled for, the obtained results indicated a pattern of inter-relationships across all variables similar to results based on the full data set. Therefore, age and gender were not considered variables of significant influence in the present study.

The instruments used were considered suitable measures of the underlying constructs and indicated adequate reliability. Factor solutions as proposed by the respective scale developers, were generally supported. However, the measurement of Psychoticism remained problematic. As such, in an attempt to reduce measurement error, three items from the Psychoticism scale were deleted prior to SEM analyses. Additionally, the factorial structure of the GRAS was amended in accordance with findings in the present study and previous research (e.g., Arneklev et al., 1999; Flora et al., 2003; Grasmick et al., 1993; Longshore et al., 1996; Romero et al., 2003). Considering previous research findings, theoretical assertions and the findings in the present study, these amendments, although not ideal, were considered prudent.

SEM analyses generally supported the a priori hypothesised relationships between components of GTC self-control and personality variables. The final model, Model 3, (see Figure 12) indicated moderate to large effect sizes, significant at the .05 level, and produced acceptable fit statistics. Furthermore, based on the poor fit statistics produced by two alternative models, the adequacy of Model 3 as an explanation of the personality construct of GTC self-control was supported.

In summary, the findings in the present study support the re-conceptualisation of GTC self-control as a composite of personality variables. In particular, the data suggests explicit relationships between dimensions of personality and the components of GTC self-control, as measured by the GRAS.

Present findings in light of previous research

Several aspects distinguish the present study from previous studies of Gottfredson and Hirschi's (1990) theory. Most previous studies have investigated specific theoretical assertions and/or implications of the General Theory of Crime (1990). For example - parental management (e.g., Gibbs et al., 1998, 2003), criminal opportunity (e.g., Longshore & Turner, 1998), factorial structure (e.g., Flora et al., 2003), the stability postulate (e.g., Burrton et al., 1990; Turner & Piquero, 2002), behavioural versus cognitive measurement (e.g., Marcus, 2003, 2004; Tittle et al., 2003), social consequences (Evans, et al., 1997), analogous behaviours (e.g., Paternoster & Brame, 2000) and unidimensionality of self-control (e.g., Arneklev et al., 1999; Longshore et al., 1996; Piquero et al., 2000; Piquero & Rosay, 1998). Furthermore, there have been few studies investigating the connection between Gottfredson and Hirschi's (1990) theory and personality theory (e.g., O'Gorman & Baxter, 2002; Marcus, 2003; Romero, et al., 2003).

The present study investigated explicit connections between the components of GTC self-control and a well-validated model of the three major dimensions of personality. Furthermore, construed as the opposite of self-control, specific relationships were investigated in relation to impulsivity. Additionally, this study employed exploratory and confirmatory analyses to test the factorial structure of a popular measure of GTC self-control and a priori hypothesised relationships. Using SEM, a model of the personality construct of GTC self-control was tested. Therefore, this study simultaneously investigated several aspects of GTC, integrated factors from personality theory and employed various data analysis techniques.

The present study suggests that dimensions of personality enhance the conceptualisation and operationalisation of GTC self-control. Similar to previous studies (e.g., O'Gorman & Baxter, 2002; Marcus, 2003; Romero et al., 2003), considerable overlap was found between a measure of self-control based on Gottfredson and Hirschi's (1990) theory and measures of personality conceptually similar to it. In particular, Psychoticism and Neuroticism associated with Dysfunctional impulsivity to overlap with the GTC

components of Impulsivity, Simple Tasks, Temper and Self-centeredness. On the other hand, Extraversion associated with Functional impulsivity to overlap with the GTC components of Risk Seeking and Physicality. Furthermore, in accordance with personality theory (Dickman, 1990; Eysenck, 1977, 1990), Dysfunctional impulsivity added significantly to the prediction of imprudent behaviour.

Based on the explicit connections between GTC self-control and dimensions of personality, it becomes possible to identify specific characteristics of individuals more prone to engage in behaviour without considering the long-term consequences. Furthermore, this would imply different psychological processes, neurophysiological arousal and information processing underlie behaviours viewed as lacking in self-control (e.g., Ainslie, 2001; Carver & Scheier, 1981; Dickman, 2000; Eysenck, 1967, 1990; Eysenck & Eysenck, 1978; Friedman & Lackey, 1991; Webster & Jackson, 1997).

Individuals scoring high on Neuroticism are likely to engage in impulsive behaviours to alleviate negative emotions. In the present study, positive correlations were found between Neuroticism, Dysfunctional impulsivity and the GTC components of Temper and Simple Tasks. Individuals scoring high on Psychoticism are likely to lack perseverance, be unable to tolerate frustration and engage in behaviour without thinking and reflecting on the consequences. In the present study, positive correlations were found between Psychoticism, Dysfunctional impulsivity and the GTC components of Impulsivity, Simple Tasks and Temper. However, individuals scoring high on Extraversion are likely to enjoy and pursue activities that are exciting, having a tendency to try new experiences that may be dangerous. In the present study, positive correlations were found between Extraversion, Functional impulsivity and the GTC components of Risk Seeking and Physicality.

Similarly, previous studies employing the Grasmick et al. (1993) self-control scale have found that the components of Risk Seeking and especially Physicality do not appear to measure self-control as defined in GTC (e.g., Arneklev et al., 1999; Flora et al., 2003; Grasmick et al, 1993; Romero et al., 2003). Therefore, it seems plausible that although

Extraversion may lead to risky behaviours with dangerous and aversive consequences, these are not necessarily analogous to criminal behaviour. In contrast, Psychoticism and Neuroticism seem to indicate a tendency to engage in imprudent behaviours that are more analogous with criminal acts (e.g., Dickman, 1990; Eysenck, 1977; Eysenck & Eysenck, 1978; Revelle, 1997).

The findings of the present study are comparable with previous studies of the unidimensionality of GTC self-control (e.g., Arneklev et al., 1999; Longshore et al., 1996; Piquero et al., 2000; Piquero & Rosay, 1998). Although ultimately concluding that their scale measured a unidimensional construct, exploratory principal components analysis conducted by Grasmick et al. (1993) suggested that GTC self-control might better be interpreted as a multidimensional construct. In particular, one factor tended to combine the Impulsivity and Simple-task items. Similarly, the present study found that one factor combined the Impulsivity and Simple-task items and, additionally that one factor combined the Risk Seeking and Physicality items. Employing both EFA and CFA procedures to test the unidimensionality of the Grasmick et al. (1993) self-control scale, Longshore et al. (1996) concluded that five distinguishable but correlated factors provided the best interpretation. Similarly, Flora et al. (2003) found that a higher order six-factor model provided a better description of the Grasmick et al. (1993) self-control scale.

The personality construct of Self-control

Personality characteristics are a prime source of behaviour, therefore it is surprising that Gottfredson and Hirschi (1990) did not consider personality variables compatible with their theory of self-control. Furthermore, personality traits predispose individuals to behave in certain ways (Eysenck, 1967) much the same as Gottfredson and Hirschi (1990) propose that high levels of self-control serve as a barrier preventing individuals from engaging in criminal or analogous acts. Self-control is considered an integral part of an individual's ability to delay gratification and consider the long-term consequences of their behaviour. Therefore, programmes that improve individual levels of self-control may also improve an

individual's ability to delay gratification and consider long-term consequences before acting.

A number of studies that have employed programmes designed to improve self-control, enhance delayed gratification and promote consideration of the long-term consequences have reported positive short-term outcomes (e.g., Ainsworth, 2000; Blackburn, 1994; Boekarts et al., 2000; Currie, 2003; Fishbein, 2000; Greenwood & Turner, 1987; Rodin, 1982; Spier, 2002; Strayhorn, 2002; Wolman, 1999). However, self-control is regarded as formed at an early age and relatively stable over time, therefore, *short-term* programmes may not be appropriate interventions. Considering the impact of personality variables on self-control and imprudent behaviours, alternative programmes that target individual differences and specific ways of responding could be developed. In particular, the present study suggests that specific components of self-control and personality interact to impact on imprudent behaviours. This may assist in identifying and narrowing the specific areas to target for intervention.

Evaluation of shortcomings and implications for future research

A number of limitations are recognised in the present study. In particular, while similar to previous studies, its cross-sectional nature, self-report method and moderate sample size of volunteers from a University population are recognised as not being ideal. Future research should target populations that are criminal, more ethnically diverse, and representative of varying socio-economic status. Furthermore, the limitations of self-report questionnaires and socially desirable responding are acknowledged. Demand effects and potential misunderstandings may occur if participants, by guessing the research hypotheses, respond in ways they think appropriate rather than honestly. To enhance participant honesty and understanding, future research would need to address these issues by considering demand effects when choosing questionnaires and methodologies.

The problematic Psychoticism scale is identified as the weakest aspect of the present study. While the potential statistical implications are acknowledged, findings are nevertheless consistent with theoretical assertions and make substantive sense. As such, the challenge to future research would be to replicate findings with alternative measures of Psychoticism.

Furthermore, the proposed model of hypothesised relationships between constructs of self-control, personality, impulsivity and imprudent behaviour is recognised as a version of the underlying theories and one possibility. Therefore, future research should develop and test alternative models and test the adequacy of the model in the present study with other general and criminal populations.

Conclusion

The findings of the present study suggest an enhanced conceptualisation of GTC self-control as a composite of personality traits. However, there are a number of limitations that should be considered when interpreting the results and conclusions. However, despite methodological weaknesses, the present study serves as an important first step in exploring explicit connections between GTC self-control and facets of personality. The challenge for future research would be to test the replication of findings with a different population and using different methods to measure latent variables.

Conclusions

The personality dimensions of Psychoticism, Extraversion and Neuroticism influence conceptually distinct constructs of impulsivity. Psychoticism aligned with Dysfunctional impulsivity while Extraversion aligned with Functional impulsivity. Dysfunctional and Functional impulsivity mediated the relationships of dimensions of personality with different components of GTC self-control and RBS imprudent behaviour. Dysfunctional impulsivity mediated a positive association indicated between Psychoticism and GTC self-control and, in particular, between Psychoticism and the GRAS component of Impulsivity. Functional impulsivity mediated a moderate negative association indicated between Extraversion and GTC self-control and, in particular, the positive association between Extraversion and the GRAS component of Risk Seeking. Dysfunctional impulsivity indicated a strong relationship with RBS imprudent behaviour and, as a measure of social desirability, the Lie scale indicated a negative effect on RBS imprudent behaviour. Furthermore, Neuroticism indicated a positive association with Dysfunctional impulsivity and a negative association with Functional impulsivity.

In summary, although any firm causal arguments are not possible from these results, they are consistent with hypotheses in the General Theory of Crime (Gottfredson & Hirschi, 1990) and personality theory (Dickman, 1990; Eysenck, 1967, 1977). Integrating

components of GTC self-control and dimensions of personality offered a better explanation of the relationships from a theoretical and statistical perspective and enhanced the prediction of imprudent behaviours.

Contributions to knowledge

Self-control as defined in the General Theory of Crime could better be conceptualised as a composite of personality variables. This study has made explicit connections between specific components of the GTC construct of self-control and dimensions of personality. Using SEM, an integrated model is proposed to enhance the understanding and measurement of self-control and the prediction of imprudent behaviour. By identifying specific components of self-control and personality that interact to impact on imprudent behaviour, this study may assist in narrowing the specific areas to target for intervention. The present study serves as a point of departure for future explorations of the General Theory of Crime in terms of personality variables.

Future Directions

A new measure of GTC self-control that incorporates facets of personality could be developed as an improved indicator of individual differences in the tendency to engage in criminal or analogous acts. The final model in the present study could serve as a baseline to compare models of competing theories of crime and personality. The final model in the present study could be tested in a criminal sample including a measure of actual criminal involvement.

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Appendices

List of Appendices

Appendix A: Information sheet	132
Appendix B: Demographic information survey	133
Appendix C: Personality measure	134
Appendix D: Self-control measure	135
Appendix E: Imprudent behaviour measure	136
Appendix F: Impulsivity measure	137
Appendix G: Correlations between the components of self-control and all other variables	138
Appendix H: Structural	139
Appendix I: Model 1, Hypothesised Model	140
Appendix J: Model 2, Respecified Model	141
Appendix K: Model 4, Alternative Independence Model	142
Appendix L: Model 5, Alternative Impulsivity Model	143

Appendix A: Information sheet

Investigating the personality construct of self-control as defined in the General Theory of Crime.

INFORMATION SHEET

This research is being conducted by Anja Isaacson as partial fulfillment of the requirements for the Master of Arts in Psychology degree, supervised by Mei Williams. Mei Williams may be contacted via telephone 09 414 0800 extension 9886 or email M.W.Williams@massey.ac.nz. Anja may be contacted via the school of Psychology secretary, telephone 09 414 0800 extension 9180 or email [REDACTED].

The aim of this study is to explore relationships between the construct of self-control and different personality dimensions. Data are generated from responses to items on questionnaires assessing personality traits, self-control and behaviour. Confidentiality and anonymity are guaranteed due to this being a postal survey.

This questionnaire has been distributed to academic staff and students on a mailing list generated by Massey University. Participation is voluntary and everyone is welcome to respond. If you are unable to participate, please would you pass this on to someone else.

If you choose to participate in this study, you will answer some items from questionnaires that ask about how you see yourself and the behaviours you may, or may not, engage in. To make the research valid, you need to answer all the questions. There are no right or wrong answers, and no trick questions, and you are asked to work quickly and honestly. Completion of questionnaire items implies consent and you have the right to decline to answer any particular question. Total time required is approximately 20 minutes.

The data and information collected will be used only for this research. The data will be electronically stored and archived for five years. You are welcome to contact the researcher to request a summary of findings.

Please feel free to contact Anja or Mei Williams if you have any questions or comments regarding this research project.

This project has been reviewed and approved by the Massey University Human Ethics Committee, ALB Protocol 03/073. If you have any concerns about the conduct of this research, please contact Professor Brian Murphy, Chair, Massey University Campus Human Ethics Committee: Albany, telephone 09 414 0800 (extension 9251), email B.Murphy@massey.ac.nz.

Appendix B: Demographic information survey

SURVEY

Some background information about you would be appreciated to ensure that participants in this study are representative of the broad population.

1. How old are you: _____ (in years)

2. Are you (please tick one)

Male

Female

3. Which ethnic group do you consider yourself?

New Zealander / European / Pakeha descent

New Zealander / Maori (state iwi if you wish) _____.

Pacific Islander (state which if you wish) _____.

Asian (state which if you wish) _____.

Other (please state) _____.

4. What is your current marital status?

Married or De Facto

Single / never married

Widowed

Divorced /Separated

5. Are you: (please tick one)

teaching staff

first-year student

Returning student

6. Are you working: (please tick one)

Full time

Part time

7. Are you studying: (please tick one)

Full time

Part time

Appendix C: Personality measure (EPQR-A)

Please answer the following questions by putting a circle around the 'YES' or 'NO' following the question. Work quickly and do not think too long about the exact meaning of the questions.

Please remember to answer each question

- | | | |
|--|-----|----|
| 1. Does your mood often go up and down? | YES | NO |
| 2. Are you a talkative person? | YES | NO |
| 3. Would being in debt worry you? | YES | NO |
| 4. Are you rather lively? | YES | NO |
| 5. Were you ever greedy by helping yourself to more than your share of anything? | YES | NO |
| 6. Would you take drugs, which may have strange or dangerous effects? | YES | NO |
| 7. Have you ever blamed someone for doing something you knew was really your fault? | YES | NO |
| 8. Do you prefer to go your own way rather than act by the rules? | YES | NO |
| 9. Do you often feel 'fed-up'? | YES | NO |
| 10. Have you ever taken anything (even a pin or a button) that belonged to someone else? | YES | NO |
| 11. Would you call yourself a nervous person? | YES | NO |
| 12. Do you think marriage is old-fashioned and should be done away with? | YES | NO |
| 13. Can you easily get some life into a rather dull party? | YES | NO |
| 14. Are you a worrier? | YES | NO |
| 15. Do you tend to keep in the background on social occasions? | YES | NO |
| 16. Does it worry you if you know there are mistakes in your work? | YES | NO |
| 17. Have you ever cheated at a game? | YES | NO |
| 18. Do you suffer from 'nerves'? | YES | NO |
| 19. Have you ever taken advantage of someone? | YES | NO |
| 20. Are you mostly quiet when you are with other people? | YES | NO |
| 21. Do you often feel lonely? | YES | NO |
| 22. Is it better to follow society's rules than go your own way? | YES | NO |
| 23. Do other people think of you as being very lively? | YES | NO |
| 24. Do you always practice what you preach? | YES | NO |

Appendix D: Self-control measure (GRAS)

This section asks about how you see yourself. Please circle the answer that comes closest to describing the way you think about yourself

Please read through the following statements and decide how much you either agree or disagree with each. Use the scale and circle the number that best indicates how you feel

	<i>Strongly disagree</i>	<i>Disagree somewhat</i>	<i>Agree somewhat</i>	<i>Strongly agree</i>
1. I often act on the spur of the moment without stopping to think	1	2	3	4
2. I don't devote much thought and effort to preparing for the future	1	2	3	4
3. I often do whatever brings me pleasure here and now, even at the cost of some distant goal	1	2	3	4
4. I'm more concerned with what happens to me in the short run than in the long run	1	2	3	4
5. I frequently try to avoid projects that I know will be difficult	1	2	3	4
6. When things get complicated, I tend to quit or withdraw	1	2	3	4
7. The things in life that are easiest to do bring me the most pleasure	1	2	3	4
8. I dislike really hard tasks that stretch my abilities to the limit	1	2	3	4
9. I like to test myself every now and then by doing something a little risky	1	2	3	4
10. Sometimes I take a risk just for the fun of it	1	2	3	4
11. I sometimes find it exciting to do things for which I might get in trouble	1	2	3	4
12. Excitement and adventure are more important to me than security	1	2	3	4
13. If I had a choice, I would almost always rather do something physical than something mental	1	2	3	4
14. I almost always feel better when I am on the move than when I am sitting and thinking	1	2	3	4
15. I like to get out and do things more than I like to read or contemplate ideas	1	2	3	4
16. I seem to have more energy and a greater need for activity than most other people my age	1	2	3	4
17. I try to look out for myself first, even if it means making things difficult for other people	1	2	3	4
18. I'm not very sympathetic to other people when they are having problems	1	2	3	4
19. If things I do upset people, it's their problem not mine	1	2	3	4
20. I will try to get the things I want even when I know it's causing problems for other people	1	2	3	4
21. I lose my temper pretty easily	1	2	3	4
22. Often, when I'm angry at people I feel more like hurting them than talking to them about why I am angry	1	2	3	4
23. When I'm really angry, other people better stay away from me	1	2	3	4
24. When I have a serious disagreement with someone, it's usually hard for me to talk calmly about it without getting upset	1	2	3	4

Appendix E: Imprudent Behaviour measure (RBS)

The next questions ask you to indicate how many times you may have engaged in certain behaviours. All answers are in confidence.

Please read through the following statements and decide how frequently you may have engaged in each act. Use the scale and circle the number that most accurately describes your behaviour.

	<i>Never</i>	<i>Once</i>	<i>Two or Three times</i>	<i>Fairly many times</i>	<i>Often</i>	<i>Very often</i>	<i>Always</i>
	1	2	3	4	5	6	7
1. I skipped my fare on public transportation	1	2	3	4	5	6	7
2. I would have got on much better at school or in vocational training if I had only taken things more seriously	1	2	3	4	5	6	7
3. I have been late for school or at work because I stayed out too late the night before	1	2	3	4	5	6	7
4. Together with people of my own age we ended up in fist-fights	1	2	3	4	5	6	7
5. I drove a car or motorbike without a license	1	2	3	4	5	6	7
6. I tried hashish or marijuana	1	2	3	4	5	6	7
7. My friends and I have on occasion smashed things just because we felt like it	1	2	3	4	5	6	7
8. I have passed on information to others although I had promised to keep it to myself	1	2	3	4	5	6	7
9. In the mood, I have drunk more than I could handle	1	2	3	4	5	6	7
10. I have switched price tags on merchandise in order to pay less for an article	1	2	3	4	5	6	7
11. I've got physically rough when someone provoked me	1	2	3	4	5	6	7
12. I have borrowed things and never returned them	1	2	3	4	5	6	7
13. I have driven a car or motorbike after drinking alcohol	1	2	3	4	5	6	7
14. I have taken a higher dosage of medicine than recommended by the doctor or the package insert	1	2	3	4	5	6	7
15. I could have saved myself a lot of trouble if I had watched what I said	1	2	3	4	5	6	7
16. I was responsible for a road accident	1	2	3	4	5	6	7
17. I have been late for important appointments	1	2	3	4	5	6	7
18. On holiday, I have spent all my money before the vacation was over	1	2	3	4	5	6	7
19. There was something else when the time came to do homework	1	2	3	4	5	6	7
20. I have bought something of considerable value without comparing prices beforehand	1	2	3	4	5	6	7
21. I did no longer care for people who used to be my friends	1	2	3	4	5	6	7

Appendix F: Impulsivity measure (DII)

Please answer the following questions by putting a circle around the 'TRUE' or 'FALSE' following the question.

Please remember to answer each question

1. Often, I don't spend enough time thinking over a situation before I act.	True	False
2. I try to avoid activities where you have to act without much time to think first.	True	False
3. I don't like to make decisions quickly, even simple decisions, such as choosing what to wear, or what to have for dinner.	True	False
4. I enjoy working out problems slowly and carefully.	True	False
5. I am good at taking advantage of unexpected opportunities, where you have to do something immediately or lose your chance.	True	False
6. I would enjoy working at a job that required me to make a lot of split-second decisions.	True	False
7. I often make up my mind without taking time to consider the situation from all angles.	True	False
8. I have often missed out on opportunities because I couldn't make up my mind fast enough.	True	False
9. I often say and do things without considering the consequences.	True	False
10. I frequently make appointments without thinking about whether I will be able to keep them.	True	False
11. I am uncomfortable when I have to make up my mind rapidly.	True	False
12. I don't like to do things quickly, even when I am doing something that is not very difficult.	True	False
13. I frequently buy things without thinking about whether or not I can really afford them.	True	False
14. I am good at careful reasoning.	True	False
15. I like to take part in really fast-paced conversations, where you don't have much time to think before you speak.	True	False
16. I like sports and games in which you have to choose your next move very quickly.	True	False
17. Many times the plans I make don't work out because I haven't gone over them carefully enough in advance.	True	False
18. I often get into trouble because I don't think before I act.	True	False
19. Most of the time, I can put my thoughts into words very rapidly.	True	False
20. People have admired me because I can think quickly.	True	False
21. I will often say whatever comes into my head without thinking first.	True	False
22. Before making any important decision, I carefully weigh the pros and cons.	True	False
23. I rarely get involved in projects without first considering the potential problems.	True	False

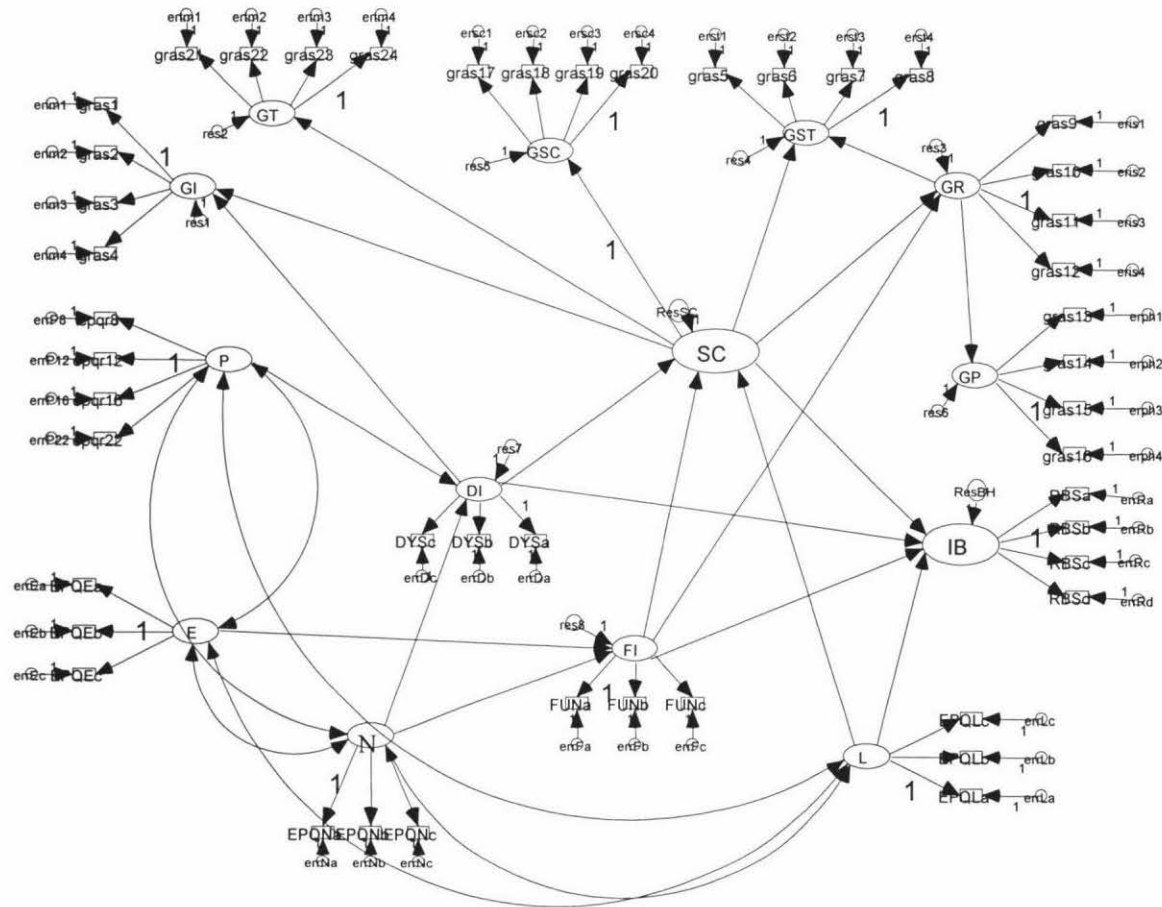
Appendix G: Correlations between the components of self-control and all other variables

	EPQE	EPQN	EPQP	EPQL	GRASIMP	GRASSIM	GRASRIS	GRASPHY	GRASSEL	GRASTEN	RBSTOT	DIIFUN	DIIDYS	
EPQE	Pearson Correlation Sig. (1-tailed) N	M = 3.52 SD = 2.106												
EPQN	Pearson Correlation Sig. (1-tailed) N	-.108 .067 193	M = 2.61 SD = 1.868											
EPQP	Pearson Correlation Sig. (1-tailed) N	.028 .351 193	-.062 .195 193	M = 1.52 SD = 1.146										
EPQL	Pearson Correlation Sig. (1-tailed) N	-.085 .119 193	-.119* .049 193	-.112 .060 193	M = 2.37 SD = 1.657									
GRASIMP	Pearson Correlation Sig. (1-tailed) N	.098 .087 193	.096 .091 193	.179* .006 193	-.103 .078 193	M = 8.24 SD = 2.298								
GRASSIM	Pearson Correlation Sig. (1-tailed) N	-.228** .001 193	.233** .001 193	-.138* .028 193	-.067 .177 193	.314** .000 193	M = 7.46 SD = 2.487							
GRASRIS	Pearson Correlation Sig. (1-tailed) N	.422** .000 193	-.139* .027 193	.215** .001 193	-.117 .053 193	.169* .009 193	-.335** .000 193	M = 9.53 SD = 2.500						
GRASPHY	Pearson Correlation Sig. (1-tailed) N	.302** .000 193	-.006 .468 193	.067 .176 193	-.060 .202 193	.063 .193 193	-.116 .054 193	.419* .000 193	M = 9.23 SD = 2.846					
GRASSEL	Pearson Correlation Sig. (1-tailed) N	-.101 .081 193	.082 .128 193	.098 .088 193	-.158* .014 193	.250** .000 193	.211** .002 193	-.011 .439 193	.104 .075 193	M = 6.20 SD = 1.985				
GRASTEN	Pearson Correlation Sig. (1-tailed) N	.009 .448 193	.352** .000 193	.118 .051 193	-.178* .007 193	.283** .000 193	.241** .000 193	-.078 .142 193	-.069 .171 193	.281** .000 193	M = 7.99 SD = 2.929			
RBSTOT	Pearson Correlation Sig. (1-tailed) N	.123* .044 193	.198** .003 193	.296** .000 193	-.457** .000 193	.399** .000 193	.193** .004 193	.108 .068 193	.083 .127 193	.314** .000 193	.273** .000 193	M = 44.95 SD = 9.691		
DIIFUN	Pearson Correlation Sig. (1-tailed) N	.357** .000 193	-.304** .000 193	.010 .443 193	-.012 .433 193	-.020 .389 193	-.332** .000 193	.250** .000 193	.128* .038 193	-.124* .043 193	-.276* .000 193	-.030 .340 193	M = 6.10 SD = 2.927	
DIIDYS	Pearson Correlation Sig. (1-tailed) N	.208** .002 193	.209** .002 193	.174** .008 193	-.218** .001 193	.577** .000 193	.212** .002 193	-.178** .007 193	.176** .007 193	.166* .011 193	.379** .000 193	.457** .000 193	.022 .379 193	M = 3.25 SD = 2.935

** . Correlation is significant at the 0.01 level (1-tailed); * . Correlation is significant at the 0.05 level (1-tailed).

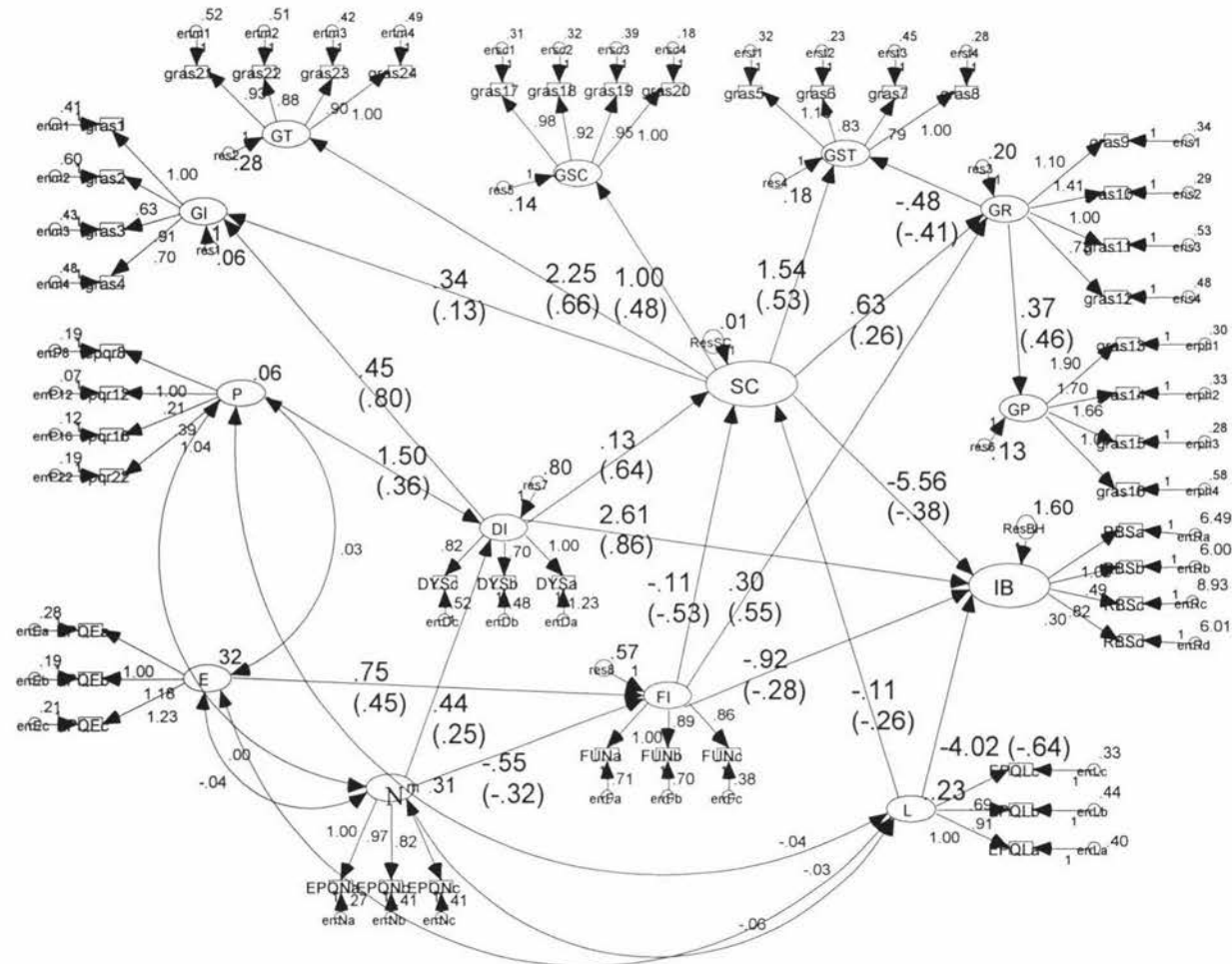
* . Note: Presented on the diagonal - (M) = mean score; (SD) = standard deviation

Appendix H. Structural model with indicator variables



Note: All paths are significant at the .05 level. Path values are unstandardised estimates with standardised parameter estimates presented in parentheses. GI = GRAS Impulsivity, GT = GRAS Temper, GSC = GRAS Self-centered, GST = GRAS Simple Tasks, GR = GRAS Risk Seeking, GP = GRAS Physical Activities, SC = GTC Self-control, P = Psychoticism, DI = Dysfunctional Impulsivity, IB = Imprudent Behaviours, E = Extraversion, FI = Functional Impulsivity, N = Neuroticism, L = Lie Scale. Constrained parameters = 1.

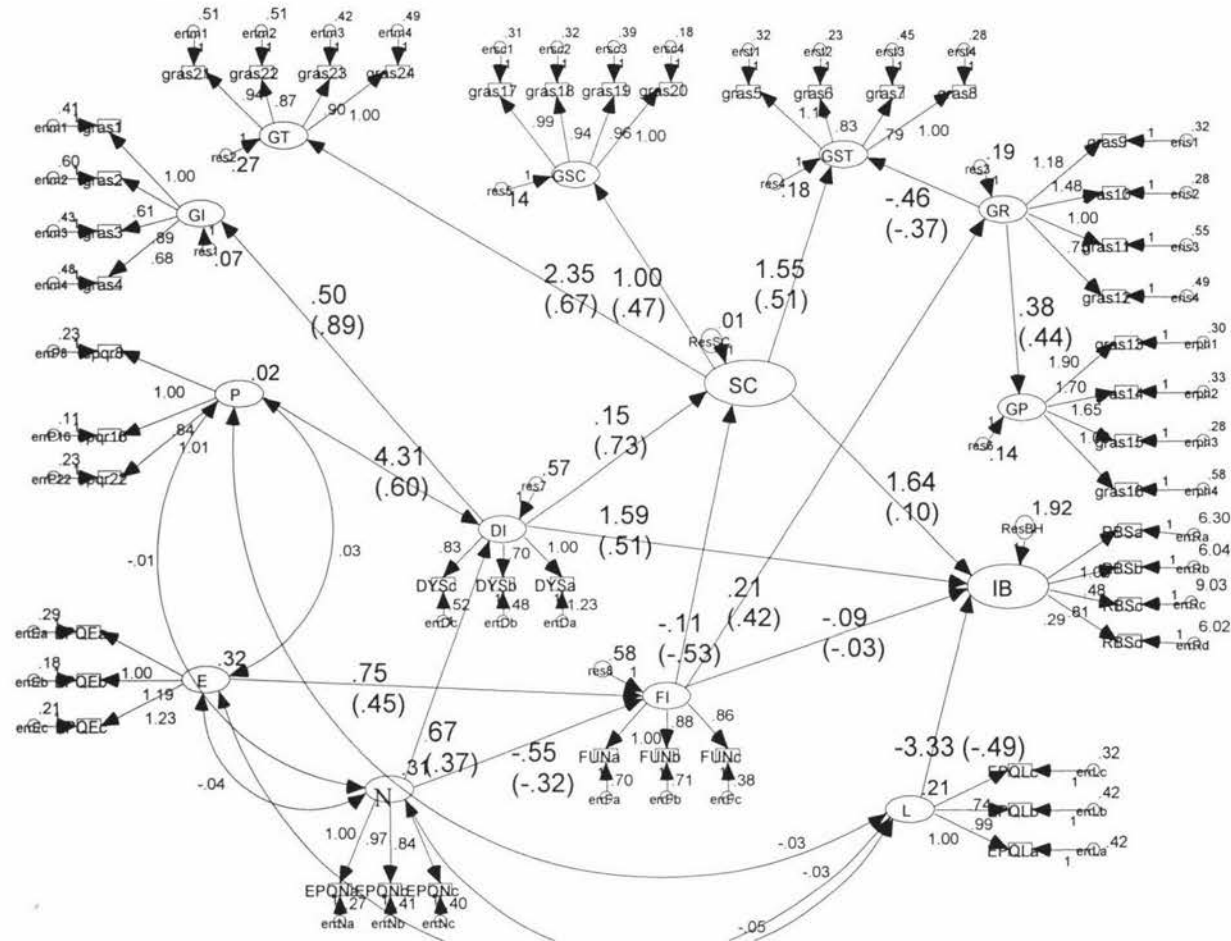
Appendix I: Model 1, Hypothesised model



Note: All paths are significant at the .05 level. Path values are unstandardised estimates with standardised parameter estimates presented in parentheses.

GI = GRAS Impulsivity, GT = GRAS Temper, GSC = GRAS Self-centered, GST = GRAS Simple Tasks, GR = GRAS Risk Seeking, GP = GRAS Physical Activities, SC = Self-control, P = Psychoticism, DI = Dysfunctional Impulsivity, IB = Imprudent Behaviours, E = Extraversion, FI = Functional Impulsivity, N = Neuroticism, L = Lie Scale. Constrained parameters = 1.00.

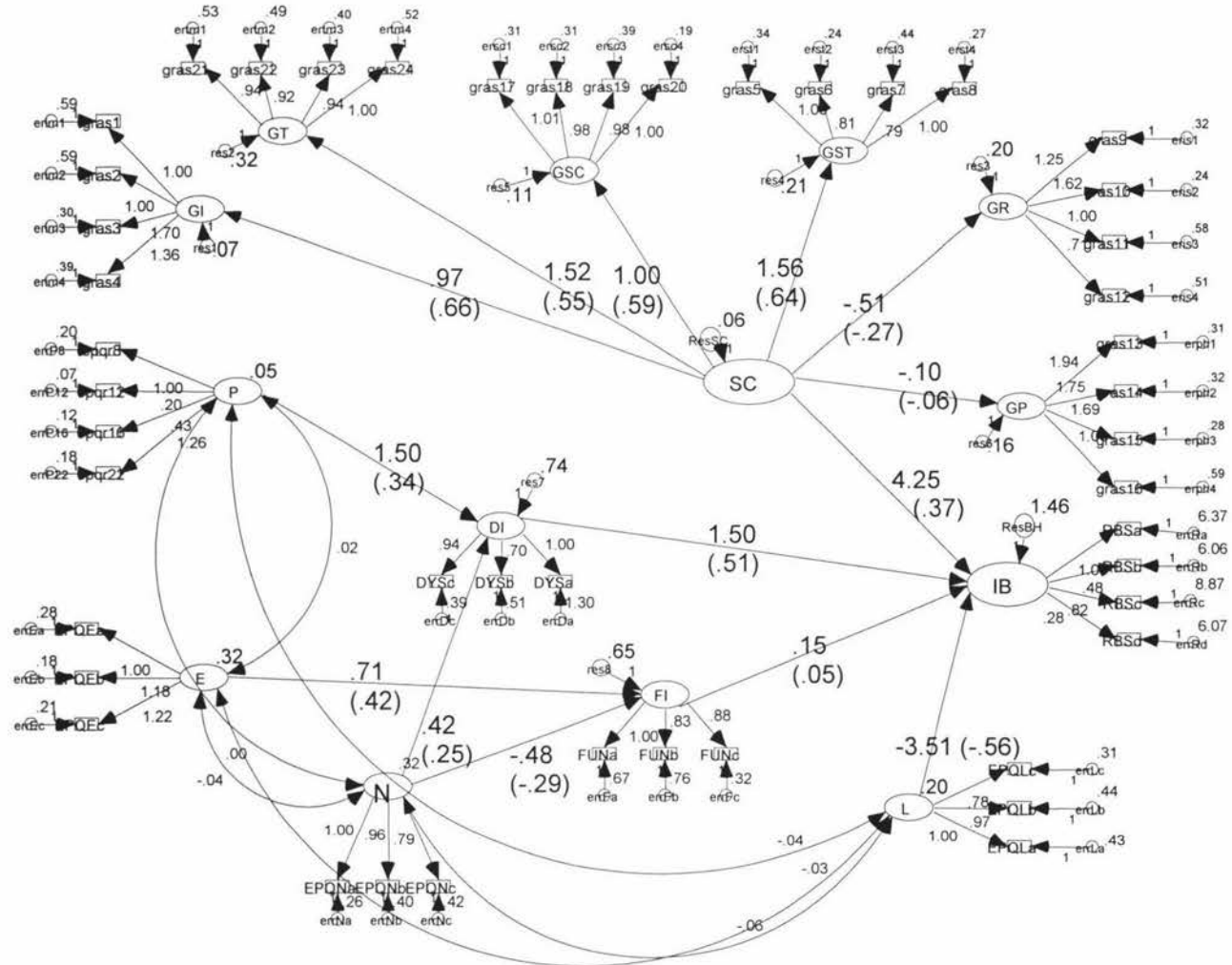
Appendix J: Model 2, Respecified Model



Note: All paths are significant at the .05 level. Path values are unstandardised estimates with standardised parameter estimates presented in parentheses.

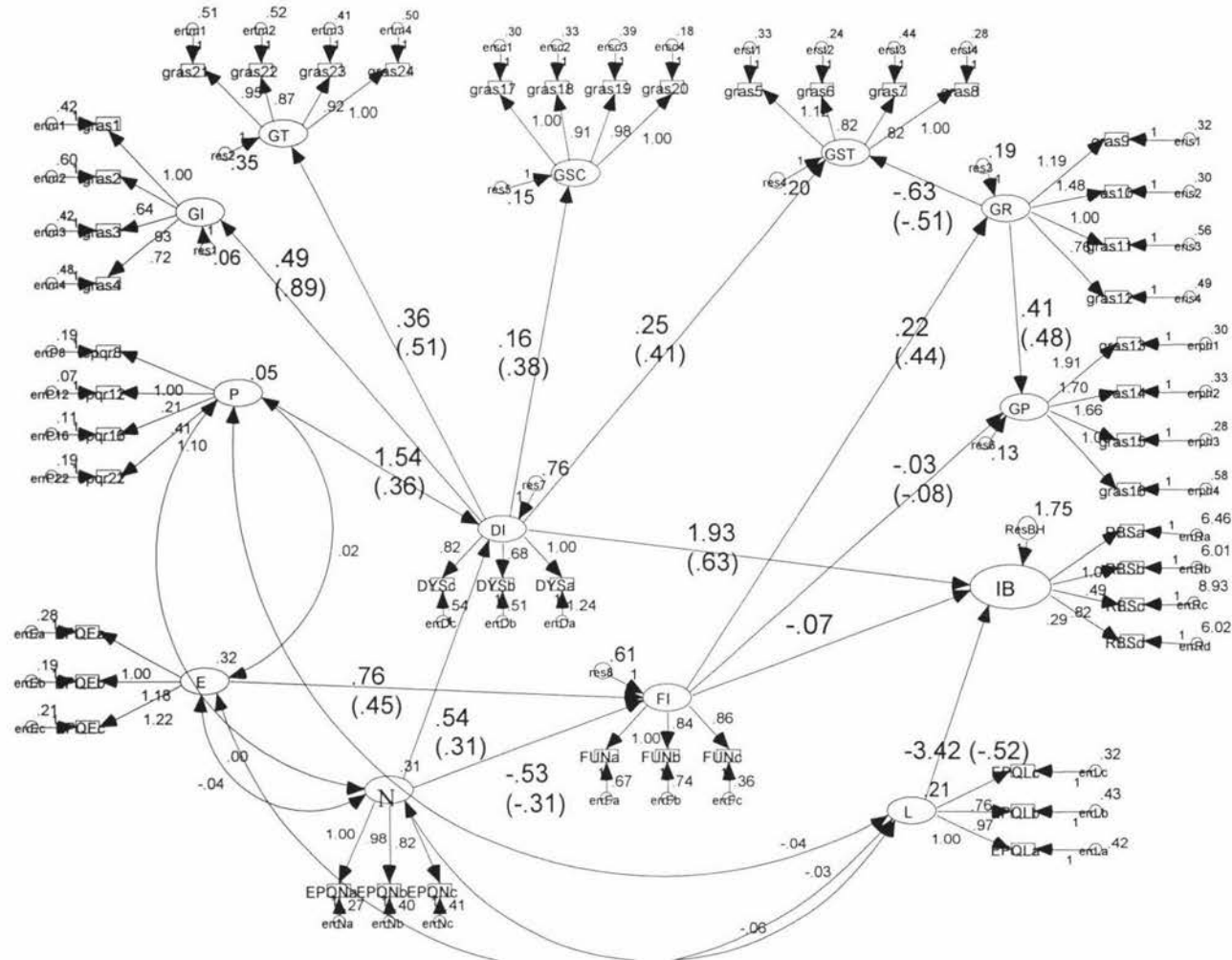
GI = GRAS Impulsivity, GT = GRAS Temper, GSC = GRAS Self-centered, GST = GRAS Simple Tasks, GR = GRAS Risk Seeking, GP = GRAS Physical Activities, SC = Self-control, P = Psychoticism, DI = Dysfunctional Impulsivity, IB = Imprudent Behaviours, E = Extraversion, FI = Functional Impulsivity, N = Neuroticism, L = Lie Scale. Constrained parameters = 1.00.

Appendix K: Model 4, Alternative Independence Model



Note: All paths are significant at the .05 level. Path values are unstandardised estimates with standardised parameter estimates presented in parentheses. Constrained parameters = 1.00.

Appendix L: Model 5 Alternative Impulsivity Model



Note: All paths are significant at the .05 level. Path values are unstandardised estimates with standardised parameter estimates presented in parentheses.

GI = GRAS Impulsivity, GT = GRAS Temper, GSC = GRAS Self-centered, GST = GRAS Simple Tasks, GR = GRAS Risk Seeking, GP = GRAS Physical Activities, SC = Self-control, P = Psychoticism, DI = Dysfunctional Impulsivity, IB = Imprudent Behaviours, E = Extraversion, FI = Functional Impulsivity, N = Neuroticism, L = Lie Scale. Constrained parameters = 1.00.