

**Academic dishonesty, self-control, and general criminality: A prospective and retrospective study of academic dishonesty in a New Zealand university**

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**Abstract**

Academic dishonesty is an insidious problem that besets most tertiary institutions, where considerable resources are expended to prevent and manage students' dishonest actions within academia. Using a mixed retrospective and prospective design this research investigated Gottfredson and Hirschi's self-control theory as a possible explanation for academic dishonesty in 264 university students. The relationship between academic dishonesty and general criminality was also examined. A significant but small to moderate relationship between academic dishonesty and general criminality was present, including correlations with general dishonesty, violent crime and drug offending sub-categories. These findings suggested that a general criminological theory may be of use in explaining academic dishonesty, but the overall ability of self-control variables to explain academic dishonesty was not strong. Controlled logistic regressions indicated that a significant positive association with academic dishonesty was only present for one of six self-control subscales (self-centeredness), and even this association was only present in the prospective study component. A strong relationship between past and future academic dishonesty was present. Implications of the study for institutions are discussed.

*Academic dishonesty, self-control, general criminality, past academic dishonesty, prospective and retrospective study*

Academic dishonesty in North American universities has been described as epidemic (Haines, Diekhoff, LaBeff, & Clark, 1986). In a review of 46 studies, Whitley (1998) found the mean prevalence rate of academic dishonesty to be more than seventy percent. The phenomenon of academic dishonesty not only jeopardizes our faith in the veracity and meaningfulness of qualifications awarded by our academic institutions, but might raise concerns about the reliability of results reported in journal articles. Studies by Brimble and Stevenson-Clarke (2005) and Lim and See (2001) found that the falsification of research data was not considered to be a particularly serious offence by students.

The high prevalence rate of academic dishonesty noted by Whitley (1998) is no unique peculiarity of American culture: a number of international studies have revealed that academic dishonesty is a widespread phenomenon. Lin and Wen's (2007) study of Taiwanese students found the prevalence rate for academic dishonesty was 61.7%, with Lim and See (2001) finding that virtually all their sample of Singaporean students admitted to at least one incident of academic dishonesty during their scholastic career. In New Zealand, de Lambert, Ellen and Taylor's (2006) survey found nearly nine out of ten students admitted to at least one of a number of cheating incidents. Robinson and Kuin (1999) noted that Asian students in a large New Zealand University comprised a far greater percentage of referrals to the disciplinary committee than their proportion within the university would indicate. The offending students reported that copying of assignments was motivated by a desire to obtain the best grade in the most efficient manner possible. Amongst the New Zealand medical students surveyed by Coverdale and Henning (2000), 39% reported having altered or manipulated their data and 29% falsifying their reference or bibliography. Collectively, these studies suggest that academic dishonesty is pervasive within universities; in New Zealand and overseas. The level of dishonesty would pose

questions about the ethical and moral conduct of future generations of academics and researchers.

A number of correlates have been linked with academic dishonesty (Crown & Spiller, 1998; McCabe, Treviño, & Butterfield, 2001; Whitley, 1998). Individual factors such as age (McCabe & Treviño, 1997; Marsden, Carroll, & Neill, 2005), academic ability (Bunn, Caudill, & Gropper, 1992; Diekhoff, Labeff, Clark, Williams, Francis, & Haines, 1996; Genereux & McLeod, 1995) and commitment to studies (Haines et al., 1986) have been found to be inversely associated with unethical behavior in the university. Academic dishonesty has been found to be more common among male students than for female students (Calabrese & Cochran, 1990; Whitley, Nelson, & Jones, 1999) as well as those with a very active social life, participating in a number of extracurricular and social activities (McCabe & Treviño, 1997). McCabe and colleagues (McCabe, 1997; McCabe & Treviño, 1993; McCabe et al., 2001) noted however that contextual factors were more influential in predicting scholastic dishonesty rather than individual factors. The factors they identified were perceived peer cheating behavior, peer disapproval of cheating behavior, perceived severity of penalties for cheating, institutional response to cheating, and the probability of being caught. Of these factors, peer influences had the greatest influence on subsequent cheating behavior (Tibbetts & Myers, 1999). While such studies assist in understanding the variables associated with academic dishonesty, they do not provide a coherent theoretical explanation for unethical misconduct within the academic environment. Theoretical explanations for the etiology of academic dishonesty can advance the understanding of the causal factors that contribute to students engaging in dishonest practices within higher institutions of learning, and guide the development of programs to prevent and address such academic misconduct.

Recent efforts at elucidating the nature and etiology of academic dishonesty have come from competing theoretical perspectives, such as rational choice theory (Tibbetts & Myers, 1999), social bond, social strain, self-control and differential association theories (Vowell & Chen, 2004), theory of planned behavior (Harding, Mayhew, Finelli, & Carpenter, 2007), anomie theory (Caruana, Ramaseshan, & Ewing, 2000), and internalized control factors (Gibson, Khey, & Schreck, 2008). The etiological theory that has gained perhaps the most attention has been Gottfredson and Hirschi's (1990) self-control theory of crime. The theory's intentions are bold: to explain all crime, at all times, and for that matter, many forms of behavior that are not sanctioned by the state. Self-control theory is extraordinarily simple. Gottfredson and Hirschi posit that the motivation for crimes is similar for all individuals: the immediate benefits of crime are obvious, if meager, and the commission of crimes arises from man's natural desire to minimize pain and maximize pleasure. It is the *long-term* consequences of crime that are often negative, and the presence of self-control that allows an individual to avoid crime and thereby maximize his or her long-term welfare. Self-control, in turn, is conceived to be the result of adequate early-childhood parenting: in particular, the monitoring of the child's behavior, and the recognition and punishing of deviant behavior when it occurs. Self-control is defined as the extent to which [individuals] are vulnerable to the temptations of the moment.

Since the publication of *A General Theory of Crime*, a prodigious number of studies have been devoted to studying the usefulness of self-control theory in predicting crime and analogous behaviors. Self-control has been shown to have statistically significant associations with outcomes as diverse as criminal acts of force and fraud (Longshore & Turner, 1998), courtship aggression (Sellers, 1999), driving under the influence (Keane, Maxim, & Teevan, 1993), drinking and cutting class (Gibbs & Giever, 1995), intentions to commit employee theft

(Langton, Piquero, & Hollinger, 2006), negative criminal justice outcomes (DeLisi, Hochstetler, Higgins, Beaver, & Graeve, 2008), thrill-seeking behaviors such as bungee jumping (Jones & Quisenberry, 2004), victimization (Schreck, Stewart, & Fisher, 2006), and even borderline personality characteristics and eating disorder symptoms (Harrison, Jones, & Sullivan, 2008). The relevance of self-control theory has been found cross-nationally and with diverse populations (Özbay, 2008; Piquero, Moffitt, & Wright, 2007; Vazsonyi, Clifford Wittekind, Belliston, & Van Loh, 2004; Vazsonyi & Klanjšek, 2008; Vazsonyi, Pickering, Junger, & Hessing, 2001; Wright, Caspi, Moffitt, & Silva, 1999). The *size* of the self-control effect on crime and analogous behaviors, however, appears to be moderate. In a meta-analysis, Pratt and Cullen (2000) found a mean correlative effect size (adjusted for sample size and interdependencies in their methodology) of 0.26 when self-control was measured via an attitudinal scale, and 0.28 when measured by a behavioral scale.

While individuals studying at a higher institution of learning would appear antithetical to a prototype of a poorly self-regulated individual, in a highly competitive environment in which the allocations of desirable grades are limited and the rewards for success significant, temptations to fraudulent behaviors that require minimal effort for success and a low chance of being caught may appeal. Self-control, as a theory of general deviance, may provide an explanatory model in which to understand and predict academic dishonesty. The contribution of self-control theory to explaining academic dishonesty has produced promising although ambiguous results. In their study, Tibbetts and Myers (1999) found a modest correlation of 0.32 between self-control and intentions to cheat in a hypothetical cheating scenario. The association became insignificant, however, when variables from a rational choice framework (especially anticipated shame) were included. Four sociological explanations were compared by Vowell and

Chen (2004), finding that a three-item index of behavioral self-control explained an additional 9.7% of the variance in past academic dishonesty once various demographic factors had been controlled for. They found stronger support, however, for differential association theory.

Cochran, Aleksa, and Sanders (2008) found that whilst self-control was predictive of academic dishonesty, regardless of the level of self-control the perception of formal sanctions for cheating had a uniform deterrence effect on unethical behavior. The only example of a prospective analysis of self-control theory and academic dishonesty we could find was Smith (2004), who allowed university students the opportunity to misreport their mark on a self-marked test in a natural setting after earlier completing the Grasmick, Tittle, Bursik, and Arneklev (1993) self-control scale. Smith used a binary logistic regression with the Grasmick et al. scale as a predictor of cheating, finding that self-control was a statistically significant predictor of cheating – but that model fit was modest, with a Nagelkerke pseudo R-square of 0.18.

A critical assumption of self-control theory is the notion of criminal or deviant versatility. Gottfredson and Hirschi (1990) assert that criminals do not specialize in particular crimes or classes of crimes but rather are as likely to commit one form of deviancy as another, given the opportunity to do so. This assumption suggests that academic dishonesty would be strongly associated with indices of general criminality. Prior studies have found an association between academic dishonesty and specific problem behaviors (Mustaine & Tewksbury, 2005) and minor deviance (Blankenship & Whitley, 2000; Jones & Quisenberry, 2004). The three studies focused on quite minor problem behaviors/deviance that included skipping class, cheating on partners, smoking cigarettes and using alcohol: it would be debatable whether these behaviors should be deemed deviant given that they are commonly observed amongst young adults. An association between academic dishonesty and various types of workplace deviance/unethical practices has



also been observed (Graves, 2008; Harding et al., 2007; Hilbert, 1985; Nonis & Swift, 2001; Sims, 1993). To our knowledge no study has examined the relationship between academic dishonesty and an index of overall/general criminality.

### **The current study**

This study had three aims. Firstly, to examine the relationship between academic dishonesty and engagement in criminal behaviors. Secondly, to examine whether self-control variables predicted retrospective as well as prospective academic dishonesty. Finally, to assess the value of past academic dishonesty in predicting *future* academic dishonesty. Most studies have examined the efficacy of self-control theory in explaining academic dishonesty using cross-sectional or retrospective designs (c.f. Bolin, 2004; Cochran et al., 2006; Cochran et al., 2008; Tibbetts & Myers, 1999). Of the studies reviewed, only Smith (2004) was found to use a prospective design in a naturalistic setting. Prospective analysis of the ability of self-control to predict academic dishonesty thus remains an understudied area as well as to the generality of deviance in relation to academic cheating.

### **Method**

#### *Research setting and procedure*

The research was conducted at a New Zealand university that has a multicampus structure and a strong reputation in distance learning. The university caters for both on- and off-campus teaching with approximately 35,000 students enrolled at the university; of these 17,000 are enrolled as internal students. On enrolment students sign a Code of Student Conduct that outlines the required standards of ethical behavior and integrity during their course of study.

Penalties for dishonest conduct are disseminated in the University Calendar and most courses give explicit instructions about academic misconduct, which are further reinforced in course materials. In addition, examinations are closely proctored and online tools are routinely used to detect plagiarism in academic assignments.

New Zealand universities do not have a culture of offering course credits to students for research participation, so students were approached in their classes to volunteer for the study by the first author (MMW). All students were seen in the first 2-3 weeks of the new semester (late July). Second and third year courses were targeted for the study to avoid including new students who had not yet had any opportunity to engage in academic dishonesty. Interested students could leave their name and contact details and this was followed up with arrangements to complete the questionnaire. Students wishing to participate in the follow-up study did so by leaving their postal address on the consent form. Consent forms were matched with a coded number on the questionnaire so that students could be sent a follow-up questionnaire. To maintain students' anonymity, reduce social desirability effects, and increase candid reporting on questions of academic dishonesty and criminal offences, the consent forms were held separately by the School Administrator who had no access to the questionnaires. Three months after the initial phase of the study (i.e. at the end of the semester) the School Administrator mailed out the follow-up questionnaire. Unlike the main study, the students completed the follow-up questionnaire in their own time and returned it to the School administration office in a sealed envelope. A small reimbursement was paid to the participants for their travel and time in completing the questionnaires.

*Participants*

Participants who volunteered for the study were undergraduate students attending a New Zealand university. Participants were enrolled in Business, Science, and Social Sciences courses. Two hundred and sixty-nine students completed the study questionnaire at initial data collection. Four students who completed the study questionnaire appeared to have only just started University that semester and therefore were in the first month of their studies. Given that these students would not have had any opportunity to engage in academic dishonesty, their data was excluded from the study; none of the four returned to follow-up. One further student was removed from the analyses due to missing data on all items on the academic dishonesty measure at the initial data collection, presumably due to a page-turning error, yielding a final sample of 264 students. Follow-up questionnaires were returned by 171 participants (65% of the initial sample).

Demographic data for the study sample at initial data collection indicated 20.5% of students had studied at a university for between one semester and one year, 28.7% between one and two years, and the remaining two or more years. The mean age was 23.9 years ( $SD = 7.3$ , range 16-73), with 55.7% of the sample being female. Fifty six percent of the sample identified as European/Pākehā, 32.2% as Asian, 7.6% as Māori or mixed Māori and European descent, 1.5% as Pacific Islander, and 2.7% as Other. A perusal of the comparison between the sample data and data for all New Zealand University students (Ministry of Education n.d.) indicated the sample was broadly similar in demographic characteristics to the general New Zealand University population. Students in the sample were slightly younger and more clustered in the 20-24 age groups than the general university population, with a greater proportion of students being of Asian descent and a lower number of Pacific Island heritage.

At follow-up the participants who returned their questionnaires were similar demographically to the full sample in terms of gender (55% female), age ( $M = 23.8$ ,  $SD = 6.8$ , range 18-57), and ethnicity (European 57.9%, Asian 30.4%, Māori/Māori and European 7%, Pacific Islander 1.8%, Other 2.9%). Some differences were observed, however, on the study variables. Participants who did not contribute to the follow-up study displayed slightly but significantly higher scores on the Grasmick et al. (1993) risk-seeking subscale,  $F(1) = 7.47$ ,  $p = .007$ ,  $\eta^2 = .03$  as well as on the physical activities subscale,  $F(1) = 5.38$ ,  $p = .021$ ,  $\eta^2 = .02$ . Significant differences were not observed on the other self-control subscales. Participants who returned to follow-up also had slightly lower levels of academic dishonesty at initial data collection ( $M = 0.65$ ,  $SD = 1.28$ ) than participants lost to follow-up ( $M = 0.82$ ,  $SD = 1.63$ ), although the difference in distributions was not statistically significant (Mann-Whitney  $p = 0.784$ ). While self-control theory is general in scope and should apply regardless of differences between the initial sample and the subset contacted at follow-up, the moderate differences between participants lost to follow-up and the remainder of the sample may slightly limit the generalizability of the study's findings.

## Measures

### *Demographic information*

Information was obtained on age, gender, ethnicity, degree studying for, status as part-time or full-time students, and grades received during the university study. Grades were reported on a 7-point Likert scale with options ranging from 1 = Mostly As to 7 = Mostly D/Fs. These were reverse coded so that high scores reflected superior grades.

*Self-control*

The Grasmick et al. (1993) self-control scale is the most widely used measure in testing self-control theory (Pratt & Cullen, 2000). Recent studies (c.f. Beaver, Wright, & DeLisi, 2007; Piquero & Bouffard, 2007; Tittle, Ward, & Grasmick, 2004) have focused on the development of new measures of self-control following Hirschi (2004, p. 543-544) redefining self-control as “the tendency to consider the full range of potential costs of a particular act... the set of inhibitions one carries with one wherever one happens to go”. Nevertheless, there is little consensus currently in how self-control should be measured and the use of a well-established instrument such as the Grasmick et al. scale remains viable. Indeed, recent studies (e.g. Harrison et al., 2008; Özbay, 2008; Vazsonyi & Klanjšek, 2008; Ward, Gibson, Boman, & Leite, 2010) have continued to utilize versions of the Grasmick et al. scale as their primary measure of self-control.

The Grasmick et al. scale is comprised of a 4-point Likert-scale with anchors (1) strongly disagree, (2) disagree somewhat, (3) agree somewhat and (4) strongly agree. The 24-item scale contains six subscales constituting the elements of self-control specified by Gottfredson and Hirschi (1990). These elements are impulsivity, preference for simple tasks, risk seeking, self centeredness, preference for physical activities and temper. Examples of items from each of the six subscales are presented in Appendix 1. While the scale has previously been subjected to a number of exploratory factor analyses (c.f. Burton, Evans, Cullen, Olivares, & Dunaway, 1999; Gibbs, Giever, & Higgins, 2003; Nagin & Paternoster, 1993; Romero, Gómez-Fraguela, Luengo, & Sobral, 2003) construct validity for the multidimensional factor structure of the scale was provided by DeLisi, Hochstetler, and Murphy (2003) and Williams, Fletcher, and Ronan (2007) in confirmatory factor analyses. Both these studies found a poor fit for a one-factor solution and a six-factor solution to be the best-fitting model. Item scores were therefore not aggregated into a

total summary score in the current study. Instead, subscales were created for each of the six self-control elements by summing scores from the four items measuring each element. Each subscale had a possible score range of 4-16 with higher scores indicative of lower self-control.

Reliability for the total scale was Cronbach's alpha of .805 (Grasmick et al, 1993), with reliability for the subscales generally above .70 (Gibson, Ward, Wright, Beaver, & DeLisi, 2010). Support for the criterion-related validity of the scale has been found in a meta-analysis carried out by Pratt and Cullen (2000), although a behavioral self-control measure showed to have stronger predictive value than the Grasmick et al. measure on a number of criminal offences (Ward et al., 2010). A study by Marcus (2003), while advocating a behavioral alternative to the Grasmick et al. scale, nevertheless found a strong correlation between a German version of the Grasmick et al. total scale and the Self-control Subscale of the California Psychological Inventory,  $r = .67, p > .01$ . This may suggest good convergent validity for the total scale.

Cronbach's alpha internal consistency reliability estimates for each of the subscales were above 0.6 with the exception of the impulsivity subscale ( $\alpha = .58$ ). While lower than that found in Gibson, Ward, Wright, Beaver, and DeLisi (2010) study, the internal consistency estimates were considered acceptable given the short length of each subscale (4 items); the limitation implied by these reliability values is noted in the Discussion section. Cronbach's alpha values for each subscale and Pearson product-moment correlations between the subscales, which were small to moderate, are shown in Table 1.

INSERT TABLE 1 HERE

*Academic dishonesty*

Self-reported academic dishonesty was assessed by Eve and Bromley's (1981) scholastic dishonesty scale. The scale contained nine representative acts of dishonesty within the academic environment (see Appendix 2). While the Eve and Bromley scale is shorter than similar measures (for example, the 20-item scale used by de Lambert et al., 2006), it has the advantage of including only those items that at least 75% of the students in Eve and Bromley's (1981) validation study agreed constituted dishonest actions. Participants were asked to indicate the frequency of the behaviors during a specified time period, with 0 = None at all, 1 = 1-2 times, or 3 = 3 or more times. The measure was administered twice – once at the beginning of the semester, at which point participants were asked about their engagement in academically dishonest behaviors at any time *during your university career*, and at follow-up at the end of the semester, when participants were asked about their engagement in dishonesty behaviors *during the last semester*. Cronbach's coefficient alpha was .65 for the total scale which was considered acceptable given the scale's short length and status as a behavioral self-report scale.

*General crime/delinquency*

To capture the multidimensionality of crime the Elliott and Ageton (1980) 40-item Self-Report of Delinquency (SRD) crime scale was modified for the study. The 40-item measure was developed primarily from offences contained in the Uniform Crime Reporting Program that were associated with arrest rates greater than 1% for young people in North America. The SRD has been used in a number of studies investigating the correlates and causes of crime (c.f. Burton et al., 1999; Canter, 1982; Evans, Cullen, Burton, Dunaway, & Benson, 1997).

Consultations with the Police Department in New Zealand were carried out to determine the appropriateness of the crime items for the New Zealand context. As a result several items were omitted, such as offences that were deemed not criminal in New Zealand such as hitchhiking, begging and prostitution, and all status crimes. Minor changes were made to drug items that reflected common usage in New Zealand. For example hashish was replaced with cannabis and barbiturate street names with rollies and pinkies. Dance drugs (i.e., ecstasy, GHB) were included as they were currently the drug of choice amongst young people. The seven commonly-used illegal substances were marijuana, hallucinogens, amphetamines, barbiturates, heroin, cocaine, and dance drugs. One drug item, marijuana, was deleted from analysis due to large univariate outliers which produced distorting influences in the multivariate analyses. Use of marijuana is very common in New Zealand, with large sample surveys indicating that approximately half of the New Zealand population admitted to having used marijuana at least once in their life (Wilkins, Girling, Sweetsur, & Butler, 2005). These changes reduced the 40 offences in the original scale to 36 crime items.

Participants were asked to record the number of times they have engaged in each offence *over the previous 12 months* at the initial data collection and *during the past semester* at the follow-up period.

Elliott and Ageton (1980) developed offence categories for the SRD scale based on Glaser's (1967) typology of offences. We elected, however, to construct offence categories based on the four of the seven offence categories used by the New Zealand Police Force (as described by Statistics New Zealand, 2009).

- Dishonesty offences (including theft): 13 items



- Drug and anti-social offences (include offences such as drunkenness in a public place and provision of alcohol to minors) : 12 items
- Violent offences, including threats: 7 items
- Property damage (vandalism etc.): 4 items

The three remaining offence categories utilized by the New Zealand Police were omitted in our analysis. Sexual offences were excluded given that only a single offence item fell into this category, and no participants reported engaging in this offence. Property abuse offences were omitted as only one item (Carrying a concealed weapon) fell into this category; the concealed weapon item was amalgamated into the violence category. Finally, the administrative offences category was omitted as no items whatsoever fell into this category.

#### *Data screening and analysis*

Data analysis was primarily performed with the SPSS 18.0 computer application. Bootstrapping analyses were completed using StatsDirect 2.7.8 (StatsDirect Ltd., 2010). Missing items for all participants at initial data collection and those returning for the follow-up study were small in number, dispersed among items and participants, and showed no clear relation to any of the study variables. The missing at random assumption therefore appeared justified for these missing data points, and missing items were replaced via Expectation Maximization imputation. Multivariate outlier checks were completed via examination of Cook's distance in combination with the suggestion of Cook (1977) to consider cases with a Cook's distance greater than the median of the  $F_{p,n-p}$  distribution as possible outliers and the natural gap principle suggested by Lawrance (1990). One case was identified as an outlier in the prospective logistic regression analyses and deleted from these analyses.

The bivariate relationship between academic dishonesty and crime (as well as group descriptive statistics) were analyzed using rank-based non-parametric statistical tests given the non-continuous, kurtotic and highly skewed distributions of the academic dishonesty and crime behavior count variables. These violations of the distributional assumptions required for parametric tests such as Pearson's product-moment correlation coefficients and ANOVA may have resulted in analytic distortions and biases if such parametric tests were utilized (Hair, Anderson, Tatham, & Black, 1998). Mann-Whitney and Kruskal-Wallis tests were used to test for group differences, and Spearman's rho to examine correlations. The Mann-Whitney U tests the null hypothesis that two groups are drawn from the same distribution, and is equivalent to a parametric *t*-test after ranking across the combined sample. The Kruskal-Wallis one-way analysis of variance is the extension of the Mann-Whitney U to three or more groups. Similarly, Spearman's rho rank class correlation coefficient is equivalent to a Pearson's product-moment correlation coefficient after data points within each variable have been converted to rankings. In addition to not requiring strict distributional assumptions, these tests have the advantage of being analogous to well-known parametric tests after the ranking of data points. The ability of self-control theory to explain academic dishonesty both retrospectively and prospectively was assessed using controlled binary logistic regressions after dichotomizing scores on Eve and Bromley (1981) scholastic dishonesty scale into categories of 0 (no incidents of academic dishonesty reported in the specified time period) and 1 (at least one incident of academic dishonesty reported in the specified time period).

## Results

### *Section 1: Descriptive and bivariate data*

Self-reported academic dishonesty frequency data for the sample is reported in Table 2 and by gender and ethnicity in Table 3. Descriptive data for the self-reported delinquency scale is shown in Table 4. As shown in Table 2 there was a low self-reported prevalence of academic dishonesty at the initial data collection: just 31.1% of the sample reported committing at least one incident of academic dishonesty in their entire existing university career. Of the 171 participants who completed questionnaires at follow-up, 19.9% admitted to at least one act of academic dishonesty over the course of the semester to follow-up.

INSERT TABLE 2 HERE

Comparisons of academic dishonesty scores between ethnicity and gender groups in Table 3 show that males were slightly more likely to commit academic dishonesty than women, with Mann-Whitney tests indicating statistically significant differences at follow-up ( $p = .007$ ) but not at initial data collection ( $p = .141$ ). Kruskal-Wallis tests indicated group effects for ethnicity were statistically significant at initial data collection ( $p < .001$ ) and at follow-up ( $p = .001$ ). Mann-Whitney pairwise comparisons were significant between Europeans and Māori at follow-up ( $p = .003$ ), and Europeans and Asians at both time periods (both  $p$  values  $< .001$ ).

INSERT TABLE 3 HERE

The associations between age, gender, university grades, and academic dishonesty were also examined. Both age and university grades had small but inverse correlations with academic dishonesty that failed to reach statistical significance. Based on evidence in the literature, however, suggesting that both age (Marsden, Carroll, & Neill, 2005; McCabe & Treviño, 1997) and university grades/GPA (Bunn et al., 1992; Diekhoff et al., 1996; Genereux & McLeod, 1995) are associated with academic dishonesty, these variables were considered as controls in subsequent multivariate analyses. Age was included as a control due to multivariate predictive value at or approaching significance at both data collection points, while grades were excluded due to very weak predictive value. Ethnicity was also included as a control variable and dummy-coded as 1 (European/Pākehā) and 0 (Other). No statistically significant differences in level of academic dishonesty were apparent amongst the non-European ethnic groups (Kruskal-Wallis  $p = .234$  at initial data collection and  $p = .258$  at follow-up), justifying the collapsing of the ethnicity categories into a dichotomous format.

Academic dishonesty over the existing university career was strongly predictive of dishonesty during the semester, with a Pearson's correlation coefficient of .60 and a non-parametric Spearman's rho correlation coefficient of .48 ( $p < .001$ ); Pearson's correlation may be a reliable indicator of correlation magnitude but not significance here given very similar but non-normal distributions in both variables. This strong relationship would appear to be consistent with the general finding in the deviancy literature that past crime/deviant behavior is the best predictor of future crime/deviant behavior (c.f. Nagin & Paternoster, 1991).

Despite the low rates of self-reported academic dishonesty in the sample participants reported moderate to high levels of criminal activities, with the majority of students admitting to at least one criminal act in the past 12 months at initial data collection and in the semester to

follow-up as shown in Table 4. Drug and anti-social offences were the category most commonly engaged in, followed by dishonesty offences.

INSERT TABLE 4 HERE

There were statistically significant inverse correlations between the total of all offending and age (Spearman's  $\rho = -.22, p < .001$  at initial data collection and  $-.24, p = .002$  at follow-up) as well as with university grades (Spearman's  $\rho = -.22, p < .001$  at initial data collection and  $-.28, p < .001$  at follow-up). These findings are coherent with the established relationship between intelligence and age with crime (Erickson, 1928; Hirschi & Hindelang, 1977; Moffitt, Gabriella, Mednick, & Schulsinger, 1981). Group effects for sex were found (Mann-Whitney  $p < .001$  at both initial data collection and follow-up), with male students self-reporting greater involvement in general criminality than female students.

### *Section 2: The relation of academic dishonesty to general delinquency*

Data on self-reported academic dishonesty and crime/delinquency was obtained at both initial data collection and follow-up. Bivariate relationships between academic dishonesty and summated totals of offences for the SRD scale *in toto* and for individual offence categories were examined.

As shown in Table 5, moderately sized and statistically significant bivariate rank correlations were present between academic dishonesty and offence category counts in almost all cases, except the association between academic dishonesty and property damage offences at initial data collection.

A Bonferroni correction was not employed in this analysis based on the convincing conclusions of Perneger (1998) and Nakagawa (2004) that the deleterious effects on statistical power, Type 2 error rate, and publication bias involved in using this correction outweigh its advantage in most situations. Instead, caution in the interpretation of the alpha values should be given with consideration to the number of comparisons made.

INSERT TABLE 5 HERE

*Section 3: The capacity of self-control to predict past academic dishonesty*

The bivariate associations between the various self-control subscales and the academic dishonesty measures are shown in Table 6, utilizing non-parametric Spearman's rho correlation coefficients. These coefficients indicate only weak associations between participant ranks on the individual self-control subscales and ranks on the Eve and Bromley (1981) scholastic dishonesty scale.

INSERT TABLE 6 HERE

The Eve and Bromley (1981) scale was highly right-skewed and contained a majority of zero values: i.e. most respondents reported no academic dishonesty at all. Ordinary least squares regression techniques would therefore be inappropriate, given that the obligatory homoscedasticity and normality techniques would be strongly violated. For this reason binary logistic regression was utilized. This analysis involved dichotomizing the scores on the Eve and Bromley scales (at initial data collection and follow-up) into two categories: participants who

reported at least one incident of academic dishonesty and participants who reported no academic dishonesty. Binary logistic regression has the advantage of being undemanding in assumptions, although this choice of analysis had the cost of involving some data reduction in terms of collapsing all scores of 1 or more on the Eve and Bromley scale into a single category. Binary logistic regression has been utilized in similar studies (Mustaine & Tewksbury, 2005; Smith, 2004). A guide to interpretation of the tabulated statistics provided for the logistic regressions completed is provided in Table 7.

INSERT TABLE 7 HERE

For each of the models produced the parameter/coefficient estimates for the self-control and control variable predictors are reported. The estimates of model fit for both the full model and a 'controls-only' model were evaluated so that any increases in goodness of fit attained through adding self-control predictors to the model could be observed.

As shown in Table 8 the analysis revealed that none of the Grasmick et al. (1993) subscales were statistically significant predictors of retrospective academic dishonesty at the .05 level when entered together into a controlled model; the self-centered subscale was the subscale most closely approaching significance ( $OR = 1.265, p = .120$ ). Tests of model fit indicated that the improvement in fit of the controls-only model was small and not statistically significant, as per the omnibus test of the self-control subscale block. The Akaike Information criterion also indicated that the controls-only model had a better parsimonious fit than the full model including the self-control subscales. While the analysis in Table 8 included age, sex, and ethnicity control variables, none of the self-control subscales reached significance when entered simultaneously

even without these controls present. The analysis thus far indicated the concurrent predictive capacity of the Grasmick et al. subscales for predicting whether participants fell into the dishonesty or no-dishonesty categories was fairly weak.

INSERT TABLE 8 HERE

*Section 4: The predictive capacity of self-control to future academic dishonesty*

These analyses were then repeated with academic dishonesty in the time period to follow up as the dependent variable. A binary logistic regression was again conducted with control variables entered in the first block and all six Grasmick et al. (1993) subscales entered simultaneously in the second block. As shown in Table 9 the Grasmick et al. subscales demonstrated a somewhat better predictive capacity for future academic dishonesty in that two of the subscales (self-centered and risk-seeking) were statistically significant in the total model, although the negative coefficient for the risk-seeking subscale was surprising and inconsistent with self-control theory. The self-control subscales as a whole now added a statistically significant improvement in model fit over the control variables only model, and the Akaike Information Criterion indicated better parsimonious fit for the full model than the controls-only model. This improvement in parsimonious fit was slight, however, and overall model fit as indicated by the Cox and Snell pseudo  $R^2$  remained modest.

INSERT TABLE 9 HERE



The self-centered and risk-seeking subscales also remained significant when past academic dishonesty (in dichotomous 0-1 form) was additionally entered into the controlled model in Table 9. However, the strength of the association between past and future dishonesty dwarfed the contribution of the self-control subscales, with an odds ratio of 10.001 for past academic dishonesty in predicting future dishonesty ( $p < .001$ ). Clearly, variation in self-control was not sufficient to explain the strong association between past and future dishonesty.

A concern with regard to the prospective analysis was the low number of events (i.e. participants admitting to academic dishonesty) per predictor variable – 3.78 events per variable for the main analysis in Table 9. A minimum of 5 events per variable was indicated as appropriate for logistic regression in the simulation study of Vittinghoff and McCulloch (2007). Bootstrapping bias-corrected confidence intervals across 1000 (re)samples was therefore used to confirm the robustness of relationships; the risk-seeking (95% bias-corrected confidence interval for OR: 0.246–0.877) and self-centered subscales (95%CI for OR: 1.016–3.184) remained significant.

An additional simple analysis involved testing a predictive model including the six self-control subscales without any control variables, achieving a higher events per variable figure (5.67) but without considering confounding influences. In this case the risk-seeking and self-centered subscales remained significant at somewhat more positive magnitudes (risk seeking OR = 0.572,  $p = .023$ ; self-centered OR = 1.756,  $p = .009$ ). The physical activities subscale was also just significant in this case, (OR = 1.605,  $p = .046$ ), but this finding was not robust to a bootstrapping approach (95% bias-corrected confidence interval: 0.926–2.665).

## Discussion

The first matter deserving comment in this study is the low overall self-reported prevalence of academic dishonesty in the sample: just 31.1% of the initial sample admitted at least one incident of academic dishonesty in their existing university careers, and just 19.9% of the sample at follow-up admitted to at least one incident in the semester that comprised the follow-up period. These figures are noticeably lower than prevalence estimates posted in other international (c.f. Lim & See, 2001; Lin & Wen, 2007; Whitley, 1998) and New Zealand studies (de Lambert et al., 2006). However, these prevalence estimates are not directly comparable – the academic dishonesty measure used in this study contained only more serious behaviors of academic dishonesty that a large majority of students consider dishonest (i.e. acts that 75% or more of Eve and Bromley's (1981) validation sample agreed constituted dishonesty). The benefit of using such a scale was the capacity to focus on predicting the engagement in relatively serious forms of academic dishonesty rather than attempting to explain observations on a summated scale containing an unweighted mixture of academic dishonesty items ranging from the very serious to the trivial. While it is a possibility that the low prevalence of self-reported academic dishonesty could be attributed to social desirability effects, a limitation of the study in that this was not directly evaluated, the fact that participants readily admitted to a range of criminal offences provide some reassurance that these effects were not pervasive. While divulging academic misdemeanors could have had serious consequences for students participating in the study, the possibility of this threat influencing participants' responses was reduced by providing anonymity so that students could not be identified by their responses. It is pertinent to note, however, that the study was reliant on self-report measures of academic dishonesty and no objective measures of misconduct were obtained, thus limiting the validity of the findings. The

study also focused primarily on individual-level predictors of dishonesty and so does not allow for possible interactional effects of situational or contextual variables that may influence academic misconduct, such as peer influence or knowledge of the institutional regulations and disciplinary procedures for such behaviors.

This study was the first, to our knowledge, to assess the relationship between academic dishonesty and an overall index of general criminality; based on the number of self-reported instances of engagement in four broad criminal offence categories utilized by the New Zealand Police. These analyses indicated that academic dishonesty had a small to moderate association with general criminality (Spearman's rho correlation .18 at initial data collection and .20 at follow-up). In terms of the association between academic dishonesty and individual categories of crime, not only was academic dishonesty correlated with general dishonesty offences – as one might well expect – but also with categories such as drug offences and even violent crime. In fact, of the four crime categories measured over two data collection points, only the property damage category at initial data collection had no statistically significant correlation with academic dishonesty. While these associations were again relatively small in magnitude, with correlations under 0.2 in size in most cases, the findings indicate that the findings indicate that for some students academic dishonesty is but a small part in a repertoire of criminal and deviant activities consistent with a self-control theory of crime.

Assessing the capacity of self-control subscales to predict engagement in academic dishonesty was the second aim of the study. Our analyses showed that the subscales of the Grasmick et al. (1993) scale had very limited explanatory capacity for participation in academic dishonesty. Our study is relatively rare in that we chose not to aggregate items across the entire self-control scale, based in large part on convincing evidence using the same dataset

supplemented with observations from prison inmates (Williams et al., 2007) that a unitary factor solution is not tenable for the Grasmick et al. scale. When we examined the predictive capacity of the individual self-control subscales, controlled binary logistic regressions indicated that only the self-centered subscale was a statistically significant positive predictor of engagement in academic dishonesty at follow-up, while none of the subscales were significant predictors at initial data collection. The risk-seeking subscale was also a significant negative predictor of academic dishonesty at follow-up, in contradiction with the predictions of self-control theory.

In general, the self-centered subscale variable was the best predictor of academic dishonesty of the self-control subscales, being a significant predictor at follow-up in the controlled model and being the subscale closest to reaching significance ( $p = .120$ ) at initial data collection. A similar result was found within the prison population in Williams et al. (2007). Related studies such as Arneklev et al. (1993) and Longshore, Turner, and Stein (1996) have generally found the risk-seeking subscale to be the most effective predictor of crime of the self-control subtypes. While this finding is seemingly at odds with the criminological literature, research within other social sciences tradition have found the related concepts of self-interest and narcissism to be associated with unethical conduct. For example, Kish-Gephart, Harrison, and Treviño (2010) found dispositional qualities such as self-interest, self-gain, and a lack of concern for the welfare of others were key determinants at the individual level for unethical decision-making in the workplace. In fact these personality characteristics were much more strongly associated with unethical conduct than the demographic variables of age, gender, and education. Similarly, in investigating the role of personality attributes particularly narcissism and cynicism on ethical conduct in research, Antes et al. (2007) found that those with a narcissistic disposition were less likely to engage in metacognitive ethical decision-making strategies.

Further, these individuals showed a tendency towards deceptive and selfish behavior, and an avoidance of responsibility for the consequences of their behavior. A lack of empathy for the welfare of others coupled with high levels of cynicism contributed to higher levels of moral disengagement from one's personal moral values, thus increasing the likelihood of unscrupulous conduct (Detert, Treviño, & Sweitzer, 2008). Coming from a different perspective this study provides further support for the relationship between self-centeredness and academic misconduct, as well as general deviancy and criminality. As Kish-Gephart, Harrison, and Treviño (p. 20) aptly concludes "To what extent is self-interest the key driver behind bad apples at work?": a question that could be reiterated within the halls of academic institutions.

Curiously, the relationship between risk-seeking and academic dishonesty in the current study was *negative* at follow-up in a controlled multivariate model. We can speculate that this might mean that academic dishonesty may, in at least some situations, represent *risk-averse* behavior. Whilst appearing paradoxical, as there are certainly substantial risks involved if one was caught, the prospect of academic failure, wasting vast amounts of money, and ruination of family reputations may loom larger so that on aggregate academic dishonesty may represent *risk-averse* behavior compared to the lesser likelihood of apprehension and academic expulsion. McCabe (1993) found that mild penalties were often handed down to those caught engaging in academic dishonesty. This could be because some academic dishonest behaviors could be interpreted as unintentional rather than intentional acts as ambiguity often exists amongst new undergraduates as to what constitutes plagiarism. That said, no significant relationship between academic dishonesty and risk-seeking (either positive or negative) was found at either a bivariate or multivariate level at initial data collection, and the relationship at follow-up was not significant at a simple bivariate level. As such, the finding needs to be interpreted with caution

until replicated elsewhere, although it is certainly inconsistent with the predictions of self-control theory.

Of note in the current study was that self-control dimensions were somewhat *better* predictors of future as opposed to retrospective self-report of academic dishonesty, in that two self-control subscales reached significance at follow-up (although only one of these relationships was in the predicted direction). This finding differs from that of Pratt and Cullen's (2000) meta-analysis, in which the self-control effect was weaker in prospective as opposed to retrospective studies. Indeed, prospective studies (c.f. Cretacci 2008; Rebellon and van Gundy 2005) have often found problematic results for the theory. It may be that the shorter duration of the follow-up period as opposed to the year-long period asked about at initial data collection may have meant that participants were more able to accurately recall and report their behavior at follow-up, reducing measurement error. On a purely statistical level, the substantially lower number of events (i.e. participants admitting academic dishonesty) per predictor variable in the prospective analysis means that it is possible that the enhanced predictive capacity in the prospective component was the result of overfitting to the sample data. The number of events per variable in the prospective component does indeed represent a limitation of the study. The use of bias-corrected bootstrapped confidence intervals provided an additional check on the trustworthiness of results, however.

With regards to the final aim of the study, the analysis did find past academic dishonesty to be a strong predictor of academic dishonesty, despite the rather weak predictive power of variables from self-control theory and level of general criminality in predicting participation in academic dishonesty. While the finding may not be particularly illuminating or novel, it is one worth considering in terms of its implications for practice. The strong association between past

and future academic dishonesty indicates that individuals who have participated in academic dishonesty are quite likely to offend again. While an individual academic member may believe that a student who has been apprehended may be unlikely to do so again, this study would refute such belief – and indeed, the individual may have been academically dishonest in the past. For this reason it would appear important that incidences of academic dishonesty be reported to a central disciplinary body – otherwise numerous incidences may occur within and across different faculties, with staff members erroneously assuming the acts to be isolated. Previous research by McCabe (1993) has suggested that academic staff are uncomfortable reporting such offences, due to their concern about the unclear distinction between genuine academic dishonesty and innocent misunderstandings of the university's rules for citing sources, group collaboration and so on. Lecturing staff may also feel reluctant to harm a student's career for what they believe is a minor transgression or subject students to humiliating public scrutiny. Therefore, a disciplinary body that is able to treat reported offences with sensitivity and privacy and make careful considered decisions about whether a given incident represents dishonesty or innocent error, may encourage fuller reporting from academic staff. This could then be supplemented with clear guidelines for when reporting is required from staff, incorporating the ability for academic staff to make relevant comments about a reported transgression that are considered in the disciplinary body's response – e.g. when a given behavior meets criteria for reporting but the lecturing staff feels that the offence may not comprise dishonesty. Such a system would reassure academic staff that they can report suspected offences without unintended or inappropriate consequences resulting for the student, while still preventing repeat offenders from continuing a pattern of academic dishonesty, whether intentionally or unintentionally.

While some limitations to the study have already been noted above, one particular issue for the current study is the moderate to low reliability of the self-control subscales. This shortcoming is related to our decision to treat the Grasmick et al. scale as multidimensional rather than unidimensional, based on confirmatory factor analytic evidence that the scale is not unidimensional (Williams et al. 2007; DeLisi et al. 2003). With just four items per subscale, alpha values were necessarily reduced – although relatively high for such short subscales. In general, there is a tradeoff between factorial validity and Cronbach’s alpha reliability values; alpha increases with the length of the scale, whereas in *ceteris paribus* increasing the number of items per latent factor in a confirmatory factor analytic model erodes model fit. In this case we prioritized factorial validity over Cronbach’s alpha reliability (in using self-control subscales rather than the full scale as a predictor of academic dishonesty), but this in turn is likely to have limited statistical power and reduced the probability of observing statistically significant relationships. Further studies with different population would need to be conducted to confirm the validity of the findings.

In conclusion, the relationship between academic dishonesty and various criminal behaviors in these analyses indicate that a general theory of crime may have limited utility in explaining academic dishonesty. The predictive ability of self-control for academic dishonesty is small, suggesting that much remains unaccounted for by self-control theory. This finding is consistent with previous studies that have found a statistically significant but small to moderate capacity of self-control variables to explain academic dishonesty (c.f. Smith, 2004; Tibbetts & Myers, 1999). A general theory of crime that is reliant on a single stable disposition (i.e. self-control) to explain participation in multiple crime and analogous deviant behaviors, that are themselves only correlated weakly, may have modest value. The value of taking a



multidimensional approach to self-control is reinforced in the study. Only self-centered and to a lesser extent the risk-taking dimensions of the self-control scale were associated with academic misconduct, conflicting with Gottfredson and Hirschi (1990) claim that self-control reflects a general unidimensional construct.

In general, while there is obviously an appeal for theoretical parsimony, the complexity of human behavior may mean that predicting behavior – especially a class of behavior as diverse as crime or analogous behavior – may require the consideration of individual and social influences, more in line with Hirschi's (2003) reformulation of self-control theory. While this study did not investigate situational or social variables on academic dishonesty and is a limitation of this study, future efforts to understand the causes of academic dishonesty are likely to require a broader consideration of both individual and situational factors that make dishonesty more likely. As there are limited studies that have investigated the relationship between crime and academic deviancy, it would be fruitful for replication of the study to be carried out to examine whether these findings are unique or can be generalized across individuals, time and place. Such endeavors may allow us to better understand, predict and address problematic and destructive behaviors such as academic dishonesty.

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**Table 1***Pearson intercorrelations and reliability values for Grasmick et al. self-control subscales**(N=264)*

Subscale	Impulsivity	Simple Tasks	Risk Seeking	Physical Activities	Self Centered	Temper
Impulsivity	.58					
Simple Tasks	.41**	.66				
Risk Seeking	.28**	.05	.71			
Physical Activities	.29**	.14*	.35**	.73		
Self Centered	.16*	.15*	.11	.05	.69	
Temper	.26**	.27**	.12	.07	.35**	.68

*Notes.* Cronbach's alpha subscale reliability values on main diagonal.\*Correlation significant at  $p < .05$  \*\*Correlation significant at  $p < .001$

**Table 2***Frequency of scores on Eve and Bromley (1981) Scholastic Dishonesty Scale*

Score	Initial data collection (N=264)		Follow-up (N=171)	
	Frequency	Percent	Frequency	Percent
0	182	68.9	137	80.1
1	37	14.0	17	9.9
2	17	6.4	5	3.0
3	13	4.9	10	5.8
4	6	2.3	1	0.6
5	5	1.9		
6	1	.4		
7	2	.8		
8			1	0.6
9	1	.4		

*Note.* Initial data collection = Over entire existing university career; Follow-up = Over course of current semester

**Table 3***Total scores on Eve & Bromley (1981) scholastic dishonesty scale by sex and ethnicity*

Demographic characteristic	Time zero			Follow-up		
	N	Mean	Range	N	Mean	Range
<b>Gender</b>						
Male	117	0.82	0-7	77	0.65	0-8
Female	147	0.63	0-9	94	0.20	0-3
<b>Ethnicity</b>						
European/Pākehā	148	0.44	0-7	99	0.14	0-3
Māori/Māori & Pākehā	20	0.7	0-4	12	0.75	0-3
Pacific Islander	4	0.25	0-1	3	0	0-0
Asian	85	1.14	0-9	52	0.88	0-8
Other	7	1.57	0-4	5	0	0-0

**Table 4***Descriptive data for Self-Reported Delinquency scale*

	Dishonesty offences	Drug and anti-social offences	Violent offences	Property damage offences	Total of all offences
<b>Time zero (n=264)</b>					
Mean	6.41	18.83	2.95	1.10	29.33
SD	48.37	66.59	24.23	3.22	91.57
Range	0-776	0-942	0-365	0-25	0-943
<b>Follow-up (n=171)</b>					
Mean	1.31	6.06	0.68	0.58	8.68
SD	3.32	14.47	2.85	2.87	19.05
Range	0-22	0-86	0-31	0-29	0-124



**Table 5**

*Spearman's rho rank-class correlations between Academic Dishonesty as measured by Eve and Bromley (1981) Scholastic Dishonesty scale scores and Self-Reported Delinquency Scale offence categories*

	Dishonesty offences	Drug and anti-social offences	Violent offences	Property damage offences	Total of all offences
Academic dishonesty at initial data collection (N=264)	.20** (.00)	.13* (.04)	.16* (.01)	.11 (.07)	.18** (.00)
Academic dishonesty at follow-up (N=171)	.27** (.00)	.15* (.05)	.20* (.01)	.20* (.01)	.20* (.01)

*Note.* Significance *p* values in brackets.

\**p* < .05 (2 tailed) \*\**p* < .001

**Table 6***Spearman correlations between academic dishonesty and self-control scales/subscales*

<b>Grasmick et al. subscales</b>	<b>Total of Eve and Bromley Scholastic Dishonesty scale scores</b>	
	Time zero (N=264)	Follow-up (N=171)
Impulsivity	.18* (.00)	.10 (.21)
Simple Tasks	.08 (.18)	.11 (.14)
Risk-Seeking	.10 (.12)	-.06 (.47)
Physical Activities	.10 (.09)	.12 (.12)
Self-Centered	.10 (.10)	.18* (.02)
Temper	.14* (.03)	.10 (.18)

*Note.* 2-tailed significance p levels are shown. Significance levels shown in parentheses.

\*  $p < 0.05$  \*\*  $p < .001$

**Table 7**  
*Guide to interpreting logistic regression statistics*

Statistic	Interpretation
B	The regression weight for a given variable in the tested model; this B value is raised to the exponential form to produce an OR.
OR (odds ratio)	The odds of an event occurring are the probability of an event occurring divided by the probability of it not occurring: odds = $p/(1-p)$ . For a dichotomous predictor, the OR is the odds of the event occurring in one group divided by the odds of the event occurring in another group. For a continuous predictor the OR represents the change in odds of the criterion event (e.g. academic dishonesty) occurring as a result of a change of 1 unit in the predictor variable. In the current study, self-control subscales were converted to z-scores prior to entry into logistic regression models, so OR values for self-control subscales represent the change in odds of academic dishonesty occurring as the result of an increase of one standard deviation in self-control subscale scores (in a controlled multivariate model).
Omnibus test ( $\chi^2$ sig.)	Omnibus tests were utilised to determine whether self-control subscales (considered together) added a statistically significant improvement in fit over models with control variables only.
Cox & Snell pseudo- $R^2$	Logistic regression models do not provide a true explained-variance $R^2$ figure, as in ordinary least squares (OLS) regression. Several pseudo- $R^2$ measures are available which are analogous to OLS $R^2$ figures in one or other respects. The Cox & Snell $R^2$ , whilst <i>not</i> indicating variance explained by a model, is analogous to an OLS $R^2$ in that it indicates the improvement in fit of a fitted model over a null model with no predictor variables. Values closer to one are preferred.
Akaike Information Criterion (AIC)	The AIC is a measure of parsimonious fit, or an estimate of the information lost when a given model is used to describe reality. It

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includes a penalty for model complexity. The AIC does not have an absolute interpretation but is used as a model selection tool; of two competing models, the model with the lower AIC is preferred.

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**Table 8**

*Binary logistic regression: Dependent variable: Academic dishonesty category (offender vs. non-offender) at initial data collection (N=264)*

<b>Parameter estimates</b>		<b>B</b>	<b>OR [95%CI]</b>	<b>Sig.</b>
	Constant	0.910		
<b>Control variables</b>	Age	-0.105	0.900 [0.838–0.967]	.004
	Sex (male)	0.342	1.407 [0.780–2.538]	.256
	Ethnicity (non-Euro)	1.042	2.835 [1.583–5.078]	.000
<b>Grasmick et al. subscales</b>	Impulsivity	0.125	1.134 [0.841–1.579]	.458
	Simple Tasks	0.005	1.005 [0.729–1.387]	.974
	Risk-seeking	0.148	1.159 [0.842–1.596]	.364
	Physical activities	0.001	1.001 [0.732–1.368]	.997
	Self-centered	0.235	1.265 [0.941–1.702]	.120
	Temper	0.095	1.100 [0.809–1.496]	.544
				<b>Controls</b>
<b>Estimated model fit</b>			<b>Full model</b>	<b>model</b>
Omnibus test of self-control subscale block ( $\chi^2$ sig.)			.274	n/a
Cox and Snell pseudo- $R^2$			.133	.108
Akaike Information Criterion			309.455	304.991

**Table 9**

*Binary logistic regression: Dependent variable: Academic dishonesty category (offender vs. non-offender) at follow-up (N=170)*

<b>Parameter estimates</b>		<b>B</b>	<b>OR [95%CI]</b>	<b>Sig.</b>
	Constant	-0.575		
<b>Control variables</b>	Age	-0.109	0.897 [0.801–1.003]	.058
	Sex (male)	1.486	4.420 [1.715–11.393]	.002
	Ethnicity (non-Euro)	1.211	3.356 [1.308–8.609]	.012
<b>Grasmick et al. subscales</b>	Impulsivity	0.169	1.184 [0.699–2.006]	.529
	Simple Tasks	0.067	1.070 [0.629–1.819]	.804
	Risk-seeking	-0.771	0.463 [0.258–0.829]	.010
	Physical activities	0.288	1.333 [0.794–2.239]	.276
	Self-centered	0.670	1.953 [1.226–3.113]	.005
	Temper	0.172	1.188 [0.746–1.891]	.467
				<b>Controls</b>
<b>Estimated model fit</b>			<b>Full model</b>	<b>model</b>
Omnibus test of self-control subscale block ( $\chi^2$ sig.)			.007	n/a
Cox and Snell pseudo- $R^2$			.207	.120
Akaike Information Criterion			150.685	156.395

**Appendix 1**

*Examples of items from Grasmick et al. (1993, p. 14-15) self-control scale*

Subscale	Example item
Impulsivity	“I often do whatever brings me pleasure in the here and now, even at the cost of some distant goal”
Simple tasks	“I frequently try to avoid projects that I know will be difficult”
Risk seeking	“Excitement and adventure are more important to me than security”
Physical activities	“If I had a choice, I would almost always do something physical rather than something mental”
Self centered	“I try to look out for myself first, even if it means making things difficult for other people.”
Temper	“I lose my temper pretty easily”

## **Appendix 2**

*Eve and Bromley (1981) Scholastic Dishonesty scale*

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### **Items**

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1. Gave another student answers during an exam
  2. Wrote papers for another student
  3. Developed relationship with instructor to get test information
  4. Used notes or books during a test when prohibited
  5. Sold paper to another student
  6. Looked at stolen copy of test questions
  7. Copied answers from another student during exam
  8. Purchased paper from another student
  9. Submitted paper written by other student
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