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Predictors of delinquency among adolescents and young adults: A new psychosocial control perspective

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Abstract

The present study examined whether a new psychosocial control model of youth problem behaviours, including additional variables of sensation seeking and peer risk-taking behaviour, could be expanded to explain delinquency in early and mid-late adolescence, and emerging early- and mid-young adulthood. We also explored the possible mediating role of peer risk-taking behaviours on conventional social control risk factors of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours with delinquency. Using a recently updated Australian self-report delinquency measure that can capture undetected antisocial behaviour among both adolescents and adults, a sample of 329 secondary school students (age groups 13-14, and 15-17, 50.6% female) and 334 university students (age groups 18-20, and 21-24, 68.4% female) in Canberra, Australia participated. The new psychosocial control model explained variance in delinquency with medium to large effect sizes, and beyond the original psychosocial control variables in all four age cohorts. Peer risk-taking behaviour explained the largest proportion of variance across all four age groups; its mediating role was partially supported. Impulsivity predicted delinquency among 13 to 20 years olds as did sensation seeking among 15 to 24 year olds, suggesting different, yet overlapping influences on developmental trajectories of delinquency.

Keywords

Delinquency, adolescence, young adulthood, personal control, social control

Predictors of delinquency among adolescents and young Adults: A new psychosocial control perspective

Introduction

Globally high rates of youth crime demonstrate the scope and costs of delinquent offending (World Health Organisation, 2014). According to official Australian statistics, the offending rate among youth between 15 to 24 years of age was more than double the rate of any other age cohort in Australia from 2011 to 2012 (Australian Institute of Criminology, 2014). Given that parts of the brain responsible for executive functioning, impulse control, and decision-making do not fully mature until the mid-twenties (Newman & Newman, 2012), adolescents (i.e., 13-17 years) and emerging young adults (i.e., 18-24 years) are prone to risk-taking behaviours such as delinquent activity. Owing to high rates of prevalence among this population, a comprehensive theoretical model is useful for elucidating risk factors underpinning Australian delinquency spanning a trajectory from early adolescence to emerging young adulthood.

Before we consider the benefits of expanding existing theoretical models to better explain delinquency among this cohort, there are nuances inherent within delinquent research that we aim to address. First, the act of delinquent offending is often secretive in nature and many lawbreakers are never apprehended for their crimes. As official statistics likely underestimate the incidence of youth delinquency, it is important to assess self-reported delinquency. Therefore, we use a contemporary instrument of self-reported delinquency that can expose delinquent activities among both adolescents and adults. Second, youth delinquency research is predominantly studied among official delinquent or clinical samples (White & Miller, 2015). While this assures the occurrence of delinquent offending, it does not expose the behaviour of non-clinical samples, such as high school and university students, who may also commit illegal

activities at a lesser extent. Finally, experimental delinquency is regarded as normative and peaks during mid-late adolescence (Vassallo et al., 2002). Identifying similar etiological causes among a young adult sample may indicate risk factors consistent with a more persistent trajectory of criminal behaviour. Consequently, understanding the causes and course of self-reported delinquency among early and mid-late adolescent groups and among emerging early- and mid-young adults within the general population may better inform early detection efforts.

Theoretical models of delinquency

Delinquency has received vast attention in the literature, with numerous theoretical models proposed to explain its occurrence. Many criminological models focus on social components, such as social control theory (Hirschi, 1969) and social learning theory (Akers, 1977). While Gottfredson and Hirschi (1990) updated their general theory of crime to incorporate the importance of self-control, other psychological or personality variables that are dispositional in nature have generally been overlooked in criminological theories. Although some generic deviance models, such as problem behaviour theory (Jessor & Jessor, 1977) and the deviance proneness model (Sher, 1991), link personality traits with a range of general problem behaviours, few address risk factors for delinquency specifically, particularly among Australian adolescents and young adults in the general population.

Addressing both social and psychological risk factors, Mak (1990) proposed a psychosocial control model of adolescent delinquency. Mak (1990) argued that adolescents with weakened attachments to social control agents, such as parents, school, and values (i.e., low perceived seriousness of risk-taking behaviours), and personal control factors of high impulsivity and low empathy, were more likely to engage in delinquent activities. Psychosocial control theory has been validated with official delinquent and non-delinquent adolescent samples (Mak,

1991). However, there is a lack of research examining the utility of the psychosocial control model to explain delinquency among youth at various developmental stages. Therefore, we aim to examine whether it can be modified and expanded to explain delinquency in early and mid-late adolescent and emerging early and mid-young adult age groups in an Australian context.

Expanding psychosocial control theory

A recent systematic review of the literature (Curcio, Mak & George, 2013), paired with subsequent qualitative enquiries (Curcio, Knott, & Mak, 2015), found that risk factors for adolescent delinquency were predominantly encompassed by Mak's (1990) psychosocial control theory, with the addition of sensation seeking and peer risk-taking behaviour. These findings are consistent with an extensive body of literature demonstrating the importance of peer and personality variables in predicting risk-taking activities. The absence of sensation seeking and peer influence in the current psychosocial control model may limit its explanatory power, and their inclusion in a revised model should be considered and subsequently tested.

Sensation seeking. A limitation of Mak's (1990) original psychosocial control theory is that it does not consider sensation seeking as an additional personal control risk factor to unplanned or rash impulsivity. Broader conceptualisations of impulsivity encapsulate facets such as low self-control and sensation seeking (Whiteside & Lynam, 2009). However, low self-control is often considered an equivalent construct to 'rash impulsivity' (Dawe, Gullo, & Loxton, 2004), with both traits referring to an inability to inhibit impulses, resist temptation, and consider the consequences of one's actions (Dawe et al., 2004; Duckworth & Kern, 2011). Sensation seeking is characterised by a tendency to seek out novel and thrilling forms of stimulation, yet an individual may plan ahead to do so (Whiteside & Lynam, 2009). Recent research also suggests that sensation seeking has different neurological underpinnings and trajectories of behaviour than

impulsivity (Casey, Galvan, & Hare, 2005; Galvan, Hare, Voss, Glover, & Casey; 2007). Two separate, conceptually focused measures of rash impulsivity (referred to as impulsivity from this point onwards) and sensation seeking may better explain delinquency along a trajectory from early adolescence to emerging young adulthood.

Peer risk-taking behaviour. Another limitation of the original psychosocial control model is that it does not consider peer influence. Association with risk-taking peers (also referred to as *peer risk-taking behaviour*) represents elements of social control and social learning perspectives, in that risk-prone individuals likely associate with peers who exhibit similar tendencies (control theory), and associating with peers who engage in risk-taking behaviours may increase the likelihood of adopting similar actions (social learning theory). In a meta-analysis of the criminal literature, Pratt and Cullen (2000) found that studies incorporating social learning variables with low self-control (i.e., impulsivity) explained substantially more variation in crime than studies that did not. Therefore, integrating peer risk-taking behaviour, a social learning and social control variable, into the psychosocial control model may strengthen its explanatory power.

Mediating relationships. In addition to expanding the psychosocial control model and testing its suitability in predicting delinquency among various developmental stages, the current study aims to explore the possible mediating role of peer risk-taking behaviour. While conventional social controls (parents, school, and values) may greatly influence delinquency in younger age cohorts, adolescents and older age cohorts are more susceptible to peer influence (Benson, 2013). The role of peers may be largely dependent on whether they engage in conventional or delinquent behaviour, with the former being a social control (inhibiting delinquency) and the latter being a social influence (increasing delinquency). If a young person

has weakened attachments to parents and school, and perceives risk-taking behaviours as less serious, they may be more likely to truant school and engage in unconventional activities.

Therefore, they may be more likely, and more freely available, to associate with similar risk-prone peers who endorse and perpetuate such actions. Therefore, we explore whether peer risk-taking behaviour, a variable with both social control and social learning orientations, potentially mediates the effects of more conventional social control variables (e.g., parent attachment, school connectedness, and perceived seriousness) on delinquency. To our knowledge, these mediating relationships have not been explored in previous studies, and it may be that the influence of particular social control agents varies depending on developmental stages.

The present study

We aimed to test the suitability of a revised psychosocial control framework of youth problem behaviours, which includes peer risk-taking behaviours and distinguishes between impulsivity and sensation seeking, in explaining delinquency across a trajectory from early adolescence to emerging young adulthood. Age cohorts were chosen to reflect reported developmental trajectories of delinquency - initiated during early adolescence (13-14 years), peaking during mid-late adolescence (15-17 years), and gradually declining during emerging early- (18-20 years) and mid- (21-24 years) young adulthood (e.g., Smart, Toumbourou, Sanson, & Little, 2014; Vassallo et al., 2002). Chosen age brackets also ensured requisite power for statistical analyses for each age group¹. As the focus of the current paper pertains to the ability of a new psychosocial control model of youth problem behaviours to specifically explain delinquency, we use three new Australian self-report measures to assess perceived seriousness of risk-taking behaviours, association with risk-taking peers, and self-reported delinquency.

¹ Significant results for hierarchical regression and mediation analyses for continuous age cohorts (i.e., adolescents aged 13-17 years and young adults aged 18-24 years) are reported as footnotes.

We hypothesised that the additional psychosocial variables (i.e., higher levels of sensation seeking and peer risk-taking behaviour) would be significant predictors of delinquency, over and above original variables of high impulsivity and low levels of empathy, parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours.

Predicated on research suggesting that peers become more influential than other social control agents during adolescence and young adulthood (e.g., Benson, 2013), we explored the possible mediating roles of peer risk-taking behaviours in the relationships between (a) social control agents of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviour, and (b) delinquency in each of the youth cohorts. In each mediation model we controlled for gender and the dispositional personal control variables. Figure 1 presents a visual representation of the newly proposed psychosocial control model to better explain delinquency among adolescents and young adults.

Insert Figure 1 here

Method

Design and procedure

The study received ethics approval from the appropriate ethical boards prior to commencing, and employed a cross-sectional design. Owing to the sensitive nature of questions referring to illegal behaviour, an online survey was used to collect responses from secondary school and university students. Computerised surveys have been shown to limit socially desirable responses by ensuring anonymity (Grimm, 2010), which was particularly important to accurately assess illegal involvement.

Inclusion criterion was based on age, ranging from 13 to 24 years (13 to 17 years for

adolescents, 18 to 24 years for young adult university students). Adolescent participants were approached through government and independent high schools and colleges in Canberra, Australia. Two government and two independent colleges agreed to participate ($N = 2,000$ total students, approximately). Opt-in parental consent was required for government students under the age of 18. Principals who agreed to participate then delegated to teachers, who informed students of the research project. Available teachers allowed adolescent participants to complete the online survey within an allocated time of 20 minutes in a school computer laboratory. Students who volunteered to participate in the research were given the opportunity to go into a draw to win a \$150 gift voucher.

Young adult students were recruited from a small metropolitan university located in Canberra. Unit convenors for first year psychology classes informed students ($N = 800$, approximately) of the research project during lectures and the survey link was advertised on the online unit site. Psychology students who volunteered to participate in the research were given the opportunity to receive 30 minutes of research credit or go into the draw to win a \$150 gift voucher. In addition to psychology students, the online survey was made available to all university students through the university's online learning system. Non-psychology students were offered the opportunity to enter the draw to win a \$150 gift voucher. No identifying information was recorded, and all participants were assured that participation was voluntary and that they could withdraw at any time without penalty.

Participants

Adolescents. A total of 356 adolescents initiated the online survey, with 337 completers (94.7%). Nine participants were subsequently removed for potentially biased responding by failing to answer affirmatively to at least two of the lie items embedded in the instrument

assessing delinquency. Low scores on these items (e.g., ‘failed to keep a promise’, ‘did something your parents did not want you to’, and ‘told a lie to someone’) are uncommon and reflect a tendency for respondents to portray an idealistic and unrealistic picture of themselves, which is likely to be associated with underreporting. Of the remaining 334 participants, ages ranged from 13 to 17 years ($M = 14.17$, $SD = 1.30$) and 50.6% were female. The adolescent sample was further divided into two age groups: 13-14 ($n = 208$) and 15-17 ($n = 126$).

Young adults. Of the young adult sample comprising university students, 407 of 449 participants completed the survey (90.6%). Ages ranged from 18 to 59 years. As the current study was focused on young adults, participants aged 25 and over were excluded from subsequent analysis. This resulted in 351 participants with ages ranging from 18 to 24 ($M = 19.92$, $SD = 1.68$). Of these participants, 68.4% were female. A further 5 cases were removed owing to potentially biased responding as determined by lie scores. The young adult sample was further divided into two age groups: 18-20 ($n = 228$) and 21-24 ($n = 118$).

Measures

Delinquency. An abridged 25-item version of the Australian Self-Reported Delinquency Scale-Revised (ASRDS-R; Curcio, Mak, & Knott, 2015) that holds relevance for adolescents and young adults was utilised to assess participation in illegal activities within the past 6 months. Status offence items, such as transgressions pertaining to alcohol consumption, were removed from the original measure as these behaviours are not considered illegal for individuals over 18 years of age in Australia. Consultation with the Australian Federal Police ensured the remaining items were illegal for both adolescents and adults. Included items comprise offences with varying penalties upon prosecution, demonstrating a range of marginally illegal to serious criminal behaviours. Items pertained to activities involving theft, assault, public disturbance,

illicit drug use, cyber-crime, and illegal driving behaviours, among others. The scale also included three lie items to measure potentially biased responding.

Original psychosocial control variables

The following subset of variables was used to assess components of the original psychosocial control model.

Impulsivity. As indicators of low-self control are thought to highlight rash impulsivity (Duckworth & Kern, 2011), the 13-item Brief Self-Control Scale (Tangney, Baumeister, & Boone, 2004) was used to measure impulsivity on 5-point rating scales (1 = *Not at all like me*; 5 = *Very much like me*). Items were reversed, so that higher scores on the overall scale would reflect impulsive tendencies (e.g., ‘I often act without thinking through all the alternatives’). The Brief Self Control Scale has previously demonstrated acceptable internal consistency reliability ($\alpha = .83$ and $\alpha = .85$) with undergraduate students in the United States (Tangney et al., 2004).

Empathy. The 6-item Empathic Concern subscale of the Interpersonal Reactivity Index (Davis, 1983) assesses ‘other-oriented’ feelings of sympathy and concern for unfortunate others, using 5-point rating scales (1 = *Does not describe me well*; 5 = *Describes me very well*). Higher scores reflect higher levels of emotional empathy (e.g., ‘I often have tender, concerned feelings for people less fortunate than me’). The Empathic Concern subscale has previously been found to demonstrate adequate internal consistency reliability ($\alpha = .73$) among a Dutch sample of adults (De Corte et al., 2007).

Parental attachment. A brief and current form of the Parental Bonding Instrument (PBI; Parker, Tupling, & Brown, 1979), the 8-item PBI-BC (Klimidis, Minas, & Ata, 1992), was used to measure two important dimensions of the parent-child relationship – perceived parental care versus rejection, and control versus autonomy, on a modified response format (1 = *Never*, 2 =

Sometimes, and 3 = *Usually*). Klimidis et al. (1992) report internal consistency reliability to range from .72 to .79 for mother and father scores for both care/rejection and control/autonomy items. Mother and father scores were summed and averaged in the current study. Higher scores indicate an individual's perceptions of a caring and autonomous relationship with parents (e.g., 'Appears to understand my problems and worries'), whereas lower scores indicate perceptions of a rejecting and controlling relationship (e.g., 'Tries to control everything I do').

School connectedness. The 5-item School Connectedness Scale from the original Add Health study (McNeely, Nonnemaker, & Blum, 2002) was used to measure participants' sense of connection with school. Participants responded on a 4-point Likert scale (1 = *Strongly Disagree*; 4 = *Strongly Agree*). Higher scores indicate a greater degree of school connectedness (e.g., 'I feel proud to be a student'). McNeely et al. (2002) report that internal consistency reliability for this measure was previously found at $\alpha = .88$.

Perceived seriousness of risk-taking behaviours. Adapted from the 56-item Delinquency Checklist (Curcio, Mak, et al., 2015), students were asked to rank 10 categories of risk-taking behaviours in terms of severity (1 = *Not at all Serious*, 5 = *Extremely Serious*). Higher scores indicate higher perceived severity of risk-taking behaviours. Categories included: illegal behaviour in a vehicle, driving while drunk or under the influence of illegal substances, consuming or selling illegal substances, illegally obtaining or abusing alcohol, taking or stealing money/property, purposely damaging property, purposeful assault, using or threatening to use a weapon, forcing someone to do sexual acts when that person did not consent or was underage, and cyber-bullying. As this is a new measure, no prior internal consistency reliabilities have been reported.

Revised psychosocial control variables

The following variables are proposed revisions to the psychosocial control model.

Sensation seeking. Sensation seeking was measured using a subset of six items from the Zuckerman–Kuhlman Personality Questionnaire (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). These items were selected by Steinberg et al. (2008) due to their ability to classify the core aspects of sensation seeking (e.g., ‘I like doing things just for the thrill of it’). The scale uses a dichotomous format (true/false), with higher scores indicative of higher levels of sensation seeking. Steinberg et al. (2008) previously found adequate internal consistency reliability for this measure of sensation seeking ($\alpha = .70$).

Peer risk-taking behaviour. The same 10 categories of risk-taking behaviours were adapted from the Delinquency Checklist (Curcio et al., 2015) to assess peer risk-taking behaviours. Participants were asked to indicate whether their closest friends had engaged in risky behaviours (e.g., ‘Obtained alcohol illegally or abused alcohol’, and ‘Used or threatened to use a weapon of some sort’). Participants responded on 3-point rating scales (0 = *None/Very Few of Them*, 1 = *Some of Them*, and 2 = *Most of Them*), with scores ranging from 0 to 20. Higher scores were indicative of increased peer risk-taking behaviour. As this is a new measure, no prior internal consistency reliabilities have been reported.

Results

Data analysis was conducted using PASW Version 22.0 for Windows. Analyses were conducted at a significance level of $\alpha = .05$, unless otherwise specified.

Descriptive statistics

Missing data ranged from 5.7% to 10.1% for adolescent samples, and from 10.1% to 13.3% for young adult samples. Enders (2003) reports that a missing rate of 15% to 20% is common in psychological studies, and Bennett (2001) states that statistical analysis is unlikely to

be biased when missing data is approximately 10% or less. Little's multivariate test (Little and Schenker, 1995) indicated that data were not missing completely at random. Data were likely missing at random by design (Dong & Peng, 2013), with variables measured towards the latter end of the online survey missing slightly more data. Missing data were treated with direct proration by calculating the average valid item response for each participant (Orr, 1995), where there were no more than 20% of items with missing values for a scaled score. This imputation method combines available information from the observed data for each participant in order to estimate the missing data and population parameters.

Table 1 presents descriptive statistics for continuous variables for the four age cohorts. Distributions for self-reported delinquency and for peer risk-taking behaviours were highly positively skewed. Square root transformations resulted in appropriate skewness statistics (Tabachnick & Fidell, 2001). Consequently, we utilised the square root transformed scores for delinquency and peer risk-taking behaviours in subsequent analyses. Relative to scale mid-points, participants generally reported lower levels of delinquency and peer risk-taking behaviour, and higher levels of impulsivity, empathy, parent attachment, school connectedness, perceived seriousness of risk-taking behaviours, and sensation seeking. Cronbach alpha coefficients indicated satisfactory internal consistency reliabilities, with the exception of school connectedness among the 18-20 (.66) and 21-24 (.59) age groups. This measure was retained despite lower than preferred reliabilities.

***Insert Table 1**

Here*

Age differences in self-reported delinquency

A one-way between groups analysis of variance revealed a significant difference in self-reported delinquency among the four age groups, $F(3, 664) = 13.58, p < .001$. Bonferroni post

hoc analyses revealed that participants aged 15-24 years reported significantly higher levels of delinquency than participants aged 13-14 years.

Inter-correlations

Prior to conducting hierarchical linear regressions, we analysed the correlations between delinquency and indicators of personal and social control. Table 2 presents these associations for adolescent samples aged 13-14 and 15-17 separately. For both these age cohorts, delinquency was significantly correlated with all psychosocial predictors in the expected directions. That is, higher levels of impulsivity, sensation seeking, and peer risk-taking behaviour, and lower levels of empathy, parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours were associated with higher levels of delinquency. Peer risk-taking scores maintained significant inverse relationships with each of the conventional social control variables of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours.

Insert Table 2 Here

Table 3 presents the correlations for delinquency and psychosocial control variables for the young adult samples aged 18-20 and 21-24 separately. For both these age cohorts, higher levels of delinquency were significantly correlated with higher levels of impulsivity, sensation seeking, and peer risk-taking behaviours. Higher levels of delinquency were significantly correlated with lower levels of school connectedness and perceived seriousness in the 18-20 age group, but not for the 21-24 age group. In contradiction to the original psychosocial control theory developed for adolescents, empathy and parent attachment were not found to significantly correlate with delinquency for either of the young adult age groups.

Insert Table 3 Here

Hierarchical linear regression analyses predicting delinquency

To examine the suitability of the revised psychosocial control framework, separate hierarchical linear regressions were conducted with delinquency as the outcome variable across the four age groups. Linear hierarchical regression analyses were chosen for the method's ability to detect the unique effects that sensation seeking and peer risk-taking behaviour add above and beyond the traditional psychosocial control variables. Green's (1991) rule of thumb, $N \geq 104 + m$ (where m equals the number of independent variables), suggested a required sample size of 112 to detect medium size relationships. The recommended sample size requirement was met for 13-14 ($n = 208$), 15-17 ($n = 126$), 18-20 ($n = 228$), and 21-24 ($n = 118$) age groups, suggesting adequate power to detect significant results.

Preliminary analyses indicated three multivariate outliers for the 13-14 age group, and one multivariate outlier for the 18-20 and 21-24 age groups, respectively. These were retained, as removing cases may reduce statistical power (Fichman, 2003) and their inclusion did not impact on results. For all models, the influence of gender was controlled in Step 1. Step 2 comprised variables identified in the original psychosocial control theory, including the personality variables of impulsivity and empathy, and the social control variables of parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours. To determine whether the revised psychosocial control framework could explain variance in delinquency beyond that of the original model, additional variables of sensation seeking and peer risk-taking behaviour were added at Step 3.

Table 4 presents summaries of hierarchical regression analyses predicting delinquency for adolescents aged 13-14 and 15-17, and young adults aged 18-20 and 21-24 years. For the 13-14 age group, original psychosocial control variables explained a large effect size ($f^2 = .37$), with

impulsivity, school connectedness, and gender significantly predicting delinquency. The revised psychosocial control variables significantly explained an additional 21% of the variance in delinquency, a large effect ($f^2 = .92$). Gender, impulsivity, and peer risk-taking behaviours were significant predictors in the final model.

For the 15-17 age group, original psychosocial control variables explained a large effect size ($f^2 = .41$), with impulsivity, parent attachment and perceived seriousness of risk-taking behaviours significantly predicting delinquency. The revised psychosocial control variables significantly explained an additional 28% of the variance in delinquency, a large effect ($f^2 = 1.38$). Impulsivity, sensation seeking and peer risk-taking behaviours were significant predictors in the final model.

For the 18-20 age group, the original psychosocial control variables explained a medium effect size ($f^2 = .22$), with impulsivity and perceived seriousness of risk-taking behaviours significantly predicting delinquency. The revised psychosocial control model significantly explained an additional 11% of the variance in delinquency, a large effect ($f^2 = .41$). Impulsivity, perceived seriousness of risk-taking behaviours, sensation seeking, and peer risk-taking behaviours were significant predictors in the final model.

For the 21-24 age group, the original psychosocial control variables explained a medium effect size ($f^2 = .14$), with impulsivity significantly predicting delinquency. The revised psychosocial control model significantly explained an additional 30% of variance in delinquency, a large effect ($f^2 = .69$). School connectedness, sensation seeking and peer risk-taking behaviours were significant predictors in the final model².

² Note that male gender ($\beta = .09, p = .035$), impulsivity ($\beta = .20, p < .001$), and peer risk-taking behaviour ($\beta = .57, p < .001$) were significant predictors of delinquency in the final model for a combined group of adolescents (aged 13-17 years), and that sensation seeking ($\beta = .22, p < .001$) and peer risk-taking behaviour ($\beta = .34, p < .001$) were

Overall, the revised psychosocial control variables significantly predicted additional variance in delinquency across all four age cohorts, despite explaining substantially more variance among the adolescent groups aged 13-14 (48%) and 15-17 (58%) years, than among the young adult groups aged 18-20 (29%) and 21-24 (41%) years.

Insert Table 4 Here

Mediation analyses

To explore the potentially mediating role of peer risk-taking behaviours on the relationships between parent attachment, school connectedness, and perceived seriousness of risk-taking behaviours with delinquency, we performed mediation analyses using Preacher and Hayes's (2008) method for each of the four age cohorts (13-14, 15-17, 18-20, and 21-24 years). In each set of analyses, we included gender and dispositional personality traits of impulsivity, empathy, and sensation seeking as covariates, as many of these variables had effects on delinquency in the aforementioned regression analyses. Significant indirect effects identified were between parent attachment and delinquency for the 15-17 age group, and between school connectedness and delinquency for the 13-14 and 21-24 age groups³. Risk-taking behaviours among peers were associated with low school connectedness for 13-14 year olds, and with high school connectedness for 21-24 year olds. After considering peer risk-taking behaviours, the relationship between school connectedness and delinquency weakened for the 13-14 age group, yet strengthened for the 21-24 age group.

significant predictors of delinquency in the final model for a combined group of young adults (aged 18-24 years). * $p < .05$; ** $p < .01$; *** $p < .001$.

³A breakdown of direct and indirect effects of mediation analyses are available from the authors upon request. Note that the indirect effects between parent attachment (15-17 age group) and school connectedness (13-14 age group) with delinquency became non-significant when covariates were not considered. When considering the broader adolescent age cohort of 13-17 years, peer risk-taking behaviour mediated the relationships between parent attachment and school connectedness with delinquency (these indirect effects became non-significant when covariates were not considered). For the broader age cohort of young adults aged 18-24 years, peer risk-taking behaviour mediated the relationships between parent attachment and school connectedness with delinquency regardless of whether covariates were considered or not.

Peer risk-taking behaviours also appeared to partially mediate the relationship between perceived seriousness and delinquency for the 18-20 age group, although the indirect effect was not significant. Significant results pertaining to partial or full mediations are depicted separately for the analyses involving parent attachment (Figure 2), school connectedness (Figure 3), and perceived seriousness of peer risk-taking behaviours (Figure 4).

Insert Figures 2, 3 and 4 Here

Discussion

The present study aimed to test the suitability of a revised psychosocial control framework of youth problem behaviours (Curcio et al., 2013) in explaining self-reported delinquency across a developmental trajectory from early adolescence to emerging young adulthood. We found partial support for a revised psychosocial control perspective, with the additional variables of sensation seeking and peer risk-taking behaviour explaining a significant portion of variance in delinquency beyond the original psychosocial control variables across all four age cohorts. Social control variables of school connectedness (13-14 age group), parent attachment (15-17 age group), and perceived seriousness (15-17 and 18-20 age groups) were significant risk factors for delinquency. However, the effects of these social control agents on delinquency were partially mediated by another social control/social learning variable – peer risk-taking behaviour, which explained the largest proportion of variance in delinquency among all four age cohorts. Personal control factors of impulsivity and sensation seeking were found to significantly explain delinquent offending among 13 to 20 year olds, and 15 to 24 year olds, respectively. Empathy, on the other hand, appeared to have limited contribution in the explanation of delinquency among a general population sample when other predictors were simultaneously considered.

A revised psychosocial control framework

Personal control factors. Impulsivity predicted delinquency among 13 to 20 years olds, as did sensation seeking among 15 to 24 year olds, with sensation seeking explaining slightly more variance in delinquency than impulsivity. This finding is consistent with existing research, and suggests different, yet overlapping, trajectories. For example, Galvan et al. (2007) found risk-taking behaviour was more strongly linked with sensation seeking than impulsivity, determining that influences of impulsivity gradually diminish over the course of adolescence and young adulthood. The influence of impulsivity found among the younger age cohort may be related to the relative prematurity of the brain and inability to plan ahead owing to underdeveloped executive functions common at this developmental stage (Casey et al., 2005). Sensation seeking, on the other hand, tends to peak during mid-adolescence and remains relatively stable into young adulthood (Steinberg et al., 2008). Thus, sensation seeking may be more important than impulsivity in the prediction of delinquency, likely owing to the premeditated nature of many offences. This may be particularly true for older cohorts who have a greater capacity to plan ahead. Personality traits of impulsivity and sensation seeking were strong predictors of delinquent involvement, supporting research conducted among the adult criminal literature that suggests the importance of personality traits (O’Riordan & O’Connell, 2014).

Unlike impulsivity and sensation seeking, empathy was a limited contributor in explaining delinquency among a general sample of adolescents and young adults. Empathy, or callous-unemotional traits, may be more important among clinical samples, where violent or psychopathic offending patterns may be more prevalent (Lawing, Frick, & Cruise, 2010; Marshall & Marshall, 2011). Future studies could investigate the inclusion of other

psychological indicators, such as self-esteem or egocentrism on delinquency. Similarly, while the current study looked at dispositional personality traits, psychological distress may be a precipitating psychological risk factor for delinquent behaviour.

Social control factors. A variable of both social control and social learning orientations, peer risk-taking behaviours, was found to explain the most variance in delinquency across all four age groups, and partially mediated the effects of conventional social control agents on delinquency. Those with weakened attachments to traditional social control agents may be less likely to receive parental guidance and monitoring, attend school, or hold concerns regarding the impact or severity of delinquent offending. These individuals may be more freely available to associate with like-minded peers, and adopt delinquent behaviours if these are promoted within the social group. However, the data examined in the current study was cross-sectional, and future research should establish the temporal ordering of psychosocial risk factors.

Despite some research to suggest that peer influence on delinquency decreases from approximately 20 years of age (e.g., Monahan, Steinberg, & Cauffman, 2009), the current study found risk-taking peers to be an important risk factor for young adults. For example, after considering association with risk-taking peers, the relationship between school connectedness and delinquency strengthened for the 21-24 age group. The older participants in the current study were attending university, a social environment where peers are likely to still be influential. Young adults who are connected to university may have more opportunities to associate with risk-taking peers and may experience peer pressure to engage in behaviours that could be considered deviant (e.g., theft, fighting).

Age trajectories. The current study identified that etiological risk factors for delinquency are similar for adolescents and young adults, despite slight differences in prominent risk factors

for certain age cohorts. It is likely that adolescents and emerging young adults are more susceptible to criminal activity, particularly as parts of the brain responsible for risk assessment are not fully mature (Newman & Newman, 2012). Substantially more variance was explained among the adolescent than young adult groups. However, this is to be expected given that psychosocial control theory was modelled upon adolescent samples. Future research could consider adapting the revised psychosocial control model to consider variables that might be more appropriate for older cohorts within the general population, such as commitment to work or romantic partners (Monahan et al., 2009).

Strengths and limitations

The current study has several strengths. It investigated delinquent involvement among four age cohorts, allowing better understanding of the course of youth delinquency among the general population. Secondly, a contemporary measure of self-reported delinquency provided insight into areas of youth criminal activities (excluding status offences) that often remain concealed, and demonstrated high internal consistency reliability. Thirdly, two separate, conceptually focused measures of impulsivity and sensation seeking were used. Findings indicated separate, yet overlapping, developmental trajectories and moderate inter-correlations between the two personality traits, thus confirming that unplanned impulsivity and sensation seeking are conceptually different. Fourth, two new measures of perceived seriousness of risk-taking behaviours and peer risk-taking behaviour were used. These measures were based on contemporary risk-taking activities and demonstrated high internal consistency reliability, particularly among adolescent samples. Finally, the study included a measure of peer risk-taking behaviour, a variable of both social control and social learning orientation. Consistent with Pratt and Cullen's (2000) meta-analysis of the criminal literature, incorporating elements of social

learning theory with a revised psychosocial control perspective was found to provide a better understanding of the causes of youth delinquent behaviour.

In terms of limitations, causal connections cannot be inferred owing to the cross-sectional nature of the research. Future research should test the predictive utility of the revised psychosocial control framework longitudinally, and mediation models should be replicated using time-ordered variables. While the current findings support a revised psychosocial model of delinquency, the study was conducted in a small metropolitan city in Canberra, Australia. Testing the suitability of the revised model among Australian-wide and international samples would provide further support for the revised model.

No random selection and the requirement of parental consent for adolescent government students limits the representativeness of the sample. Delinquent activity was particularly low among the 13-14 age group. This may be related to the use of a 6-month time frame as opposed to the original 12-month time frame, as well as prevalent status-related offences being removed from the current measure of delinquency. Removal of these items was necessary to ensure illegal behaviours were comparable for the young adult sample. Future researchers who are particularly interested in adolescent delinquency could use the 30-item ASRDS-R (Curcio, Mak, et al., 2015) for a better distribution of self-reported delinquency scores. Similarly, future research may wish to utilise the revised psychosocial approach to assess delinquency among at-risk youth groups, as this will further reduce issues relating to positive skew. Internal consistency reliabilities for school connectedness among university students were barely adequate. This relationship should be investigated further, as well as whether connection to particular industries or trades for non-university students reveals similar findings.

Assessing self-reported participation rates in delinquent activity may also have some

limitations, as participants may be subject to biases such as memory distortions, social desirability, and acquiescent responses (Sibley et al., 2010). Social desirability biases in reported delinquency were restricted to some extent in the current study, through the three lie items embedded into the ASRDS-R scale (Curcio, Mak, et al., 2015). Finally, survey items were not counterbalanced and therefore had more missing values for questions offered at the end of the survey. Despite this methodological oversight, we collected enough data to have the requisite power for our statistical analyses.

Conclusions and clinical implications

Findings indicate that the original psychosocial control theory has value in explaining adolescent delinquency. However, the current research demonstrates that a new model, which includes additional personal and social control/social learning variables of sensation seeking and peer risk-taking behaviour, strengthens explanatory power and is particularly relevant for emerging young adults. This finding is important as sensation seeking and peer risk-taking behaviour may be associated with more persistent trajectories of criminal behaviour, given that they were stable predictors of delinquency across adolescence and young adulthood. The ability of this framework to explain additional health-compromising behaviours, such as problem drinking, illicit drug use, or gambling could be explored to better inform prevention and intervention efforts.

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Table 1
Descriptive and Reliability Statistics for Continuous Survey Scales across Age Groups

Scale	Possible Range	Age Group: 13-14 (n = 208)				Age Group: 15-17 (n = 126)				Age Group: 18-20 (n = 228)				Age Group: 21-24 (n = 118)			
		M	SD	Skew	Cronbach's α	M	SD	Skew	Cronbach's α	M	SD	Skew	Cronbach's α	M	SD	Skew	Cronbach's α
Delinquency	0-25	1.89	3.86	3.75	.93	3.43	4.38	2.01	.90	2.96	3.88	3.28	.85	2.61	2.66	1.50	.75
	0-5	.86	1.08	1.42		1.44	1.17	.52		1.41	.98	.80		1.36	.88	.13	
SQRT delinquency	13-65	35.48	8.15	.18	.77	37.82	10.05	.22	.86	34.82	8.91	.32	.83	35.47	9.76	.45	.86
Impulsivity	6-30	22.41	4.26	-.30	.68	22.26	4.72	-.60	.79	23.99	4.51	-.74	.82	24.08	4.52	-.78	.80
Empathy	16-48	37.77	5.60	-.84	.83	36.66	5.65	-.28	.80	37.61	6.03	-.70	.82	37.91	5.87	-.36	.81
Parent attachment	5-25	18.12	3.50	-.70	.71	17.05	3.82	-.38	.74	18.76	2.91	-.66	.66	18.79	2.84	-.34	.59
School connectedness	10-50	35.95	13.43	-1.03	.98	35.93	10.89	-.77	.96	39.23	7.99	-1.59	.91	40.61	6.63	-1.29	.84
Perceived seriousness	0-6	3.47	1.70	-.22	.72	3.40	2.06	-.36	.83	3.04	1.89	-.11	.75	3.32	1.77	-.25	.69
Sensation seeking	0-20	1.40	3.11	4.26	.93	2.96	3.88	1.64	.90	3.21	3.48	1.58	.86	2.62	2.73	1.39	.76
Peer risk-taking behaviour	0-5	.67	.98	1.56		1.22	1.21	.47		1.44	1.07	.13		1.29	.98	.02	
SQRT peer risk-taking behaviour																	

Note. SQRT = Square Root Transformation.

Table 2

Correlations among Continuous Variables for 13-14 and 15-17 Age Groups

	1	2	3	4	5	6	7	8
1. Delinquency	-	.50**	-.18**	-.18*	-.33**	-.22**	.30**	.69**
2. Impulsivity	.36**	-	-.25**	-.40**	-.46**	-.21**	.44**	.49**
3. Empathy	-.30**	-.30**	-	.07	.15*	.32**	-.17*	-.14*
4. Parent attachment	-.32**	-.38**	.13	-	.51**	.18*	-.16*	-.19*
5. School connectedness	-.24**	-.42**	.21*	.47**	-	.21**	-.19*	-.42**
6. Perceived seriousness	-.41**	-.28**	.19*	.25**	.29**	-	-.23**	-.23**
7. Sensation seeking	.52**	.32**	-.22*	-.28**	-.25**	-.40**	-	.38**
8. Peer risk-taking behaviour	.72**	.29**	-.20*	-.38**	-.27**	-.31**	.41**	-

Note. The results for the 13-14 age group are represented in the top right corner of the diagonal, and the results for the 15-17 age group are represented in the bottom left corner of the diagonal.

* $p < .05$; ** $p < .01$.

Table 3

Correlations among Continuous Variables for 18-20 and 21-24Age Groups

	1	2	3	4	5	6	7	8
1. Delinquency	-	.33**	.05	-.07	-.17*	-.30**	.31**	.45**
2. Impulsivity	.33**	-	-.16*	-.20**	-.46**	-.25**	.27**	.34**
3. Empathy	.02	-.20*	-	.07	.09	.06	.08	.04
4. Parent attachment	-.12	-.25**	-.04	-	.27**	.09	-.09	-.01
5. School connectedness	-.17	-.46**	.07	.26**	-	.15*	-.05	-.14*
6. Perceived seriousness	-.07	-.16	.16	.00	.01	-	-.18**	-.24**
7. Sensation seeking	.37**	.42**	-.08	.01	-.05	-.27**	-	.30**
8. Peer risk-taking behaviour	.51**	.30**	-.02	-.10	.04	-.17	.08	-

Note. The results for the 18-20age group are represented in the top right corner of the diagonal, and the results for the 21-24age group are represented in the bottom left corner of the diagonal.

Table 4

Hierarchical Regressions Predicting Delinquency for Adolescent and Young Adult Age Groups

	Age Group: 13-14 (<i>n</i> = 208)					Age Group: 15-17 (<i>n</i> = 126)				
	B	β	<i>sr</i> ²	<i>R</i> ²	ΔR^2	B	β	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.05**					.08	
Gender	-.43	-.21**	.04							
Step 2				.27***	.23***				.29***	.29***
Gender	-.36	-.18**	.03							
Impulsivity	.05	.41***	.12			.03	.32**	.07		
Parent attachment						-.04	-.21*	.03		
School connect	-.05	-.18*	.02							
Perceived seriousness						-.02	-.19*	.03		
Step 3				.48***	.21***				.58***	.28***
Gender	-.26	-.13*	.01							
Impulsivity	.03	.23**	.03			.02	.17*	.02		
Sensation seeking						.10	.20*	.03		
Peer risk-taking behaviour	.59	.55***	.21			.49	.53***	.20		
	Age Group: 18-20 (<i>n</i> = 288)					Age Group: 21-24 (<i>n</i> = 118)				
	B	β	<i>sr</i> ²	<i>R</i> ²	ΔR^2	B	β	<i>sr</i> ²	<i>R</i> ²	ΔR^2
Step 1				.00					.01	
Step 2				.18***	.18***				.12*	.11*
Impulsivity	.03	.30***	.06			.03	.32**	.07		
Perceived seriousness	-.03	-.22**	.04							
Step 3				.29***	.11***				.41***	.30***
Impulsivity	.02	.15*	.01							
School connect						-.06	-.19*	.03		
Perceived seriousness	-.02	-.17**	.02							
Sensation seeking	.09	.19**	.03			.19	.38***	.10		
Peer risk-taking behaviour	.24	.27***	.06			.46	.52***	.22		

Note. Negative scores on gender indicate that males reported higher involvement in delinquent behaviour. School connect = School Connectedness; Perceived Seriousness = Perceived Seriousness of Risk-Taking Behaviours. For purposes of clarity, only significant values are reported.

A NEW PSYCHOSOCIAL CONTROL PERSPECTIVE

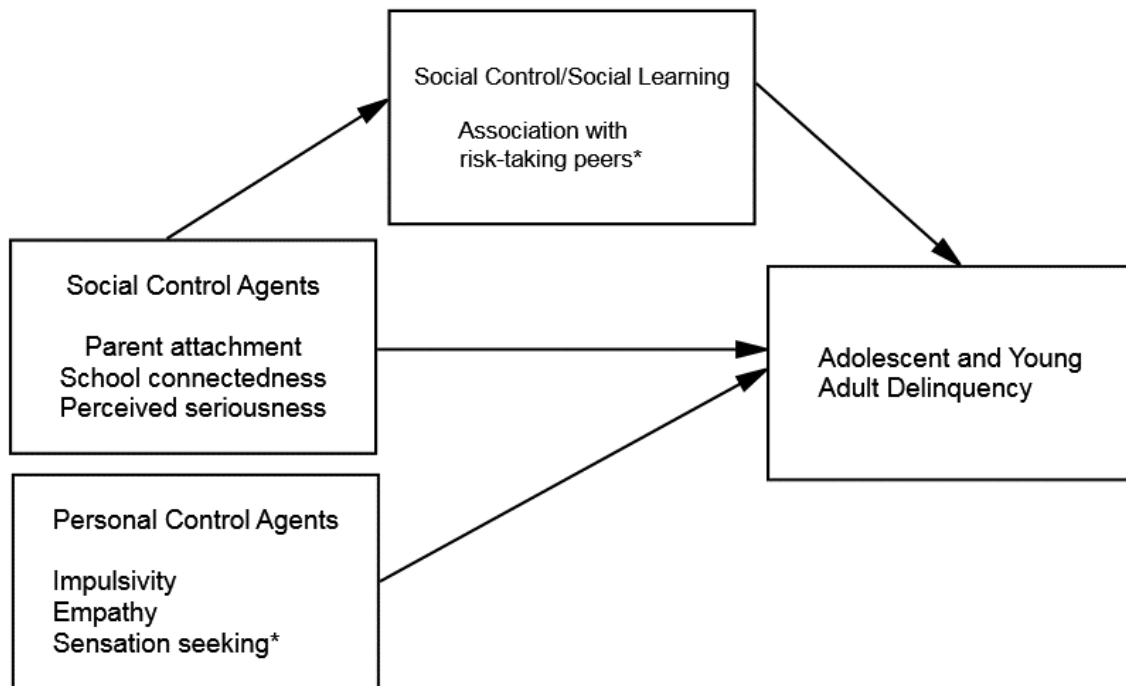


Figure 1. A visual representation of the new psychosocial control model of delinquency. New proposed variables are marked with an asterix. Note pathways to delinquency via risk-taking peers are exploratory.

A NEW PSYCHOSOCIAL CONT] Covariates

Gender
 Impulsivity
 Empathy
 Sensation seeking

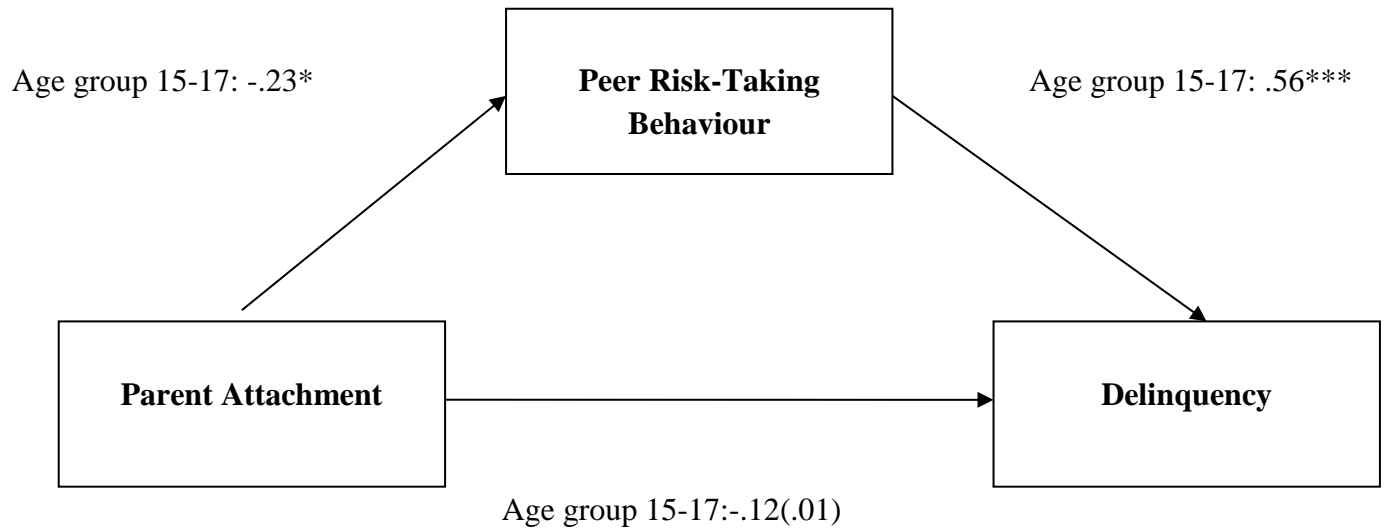


Figure 2. Mediating effects of the relationship between parent attachment and delinquency. Values are standardised regression coefficients. For the 15-17 age group final model, $R^2 = .57$, Adjusted $R^2 = .55$, $F(6, 106) = 23.66$, $p < .001$. $*p < .05$; $**p < .01$; $***p < .001$.

A NEW PSYCHOSOCIAL CONTROL PERSPECTIVE

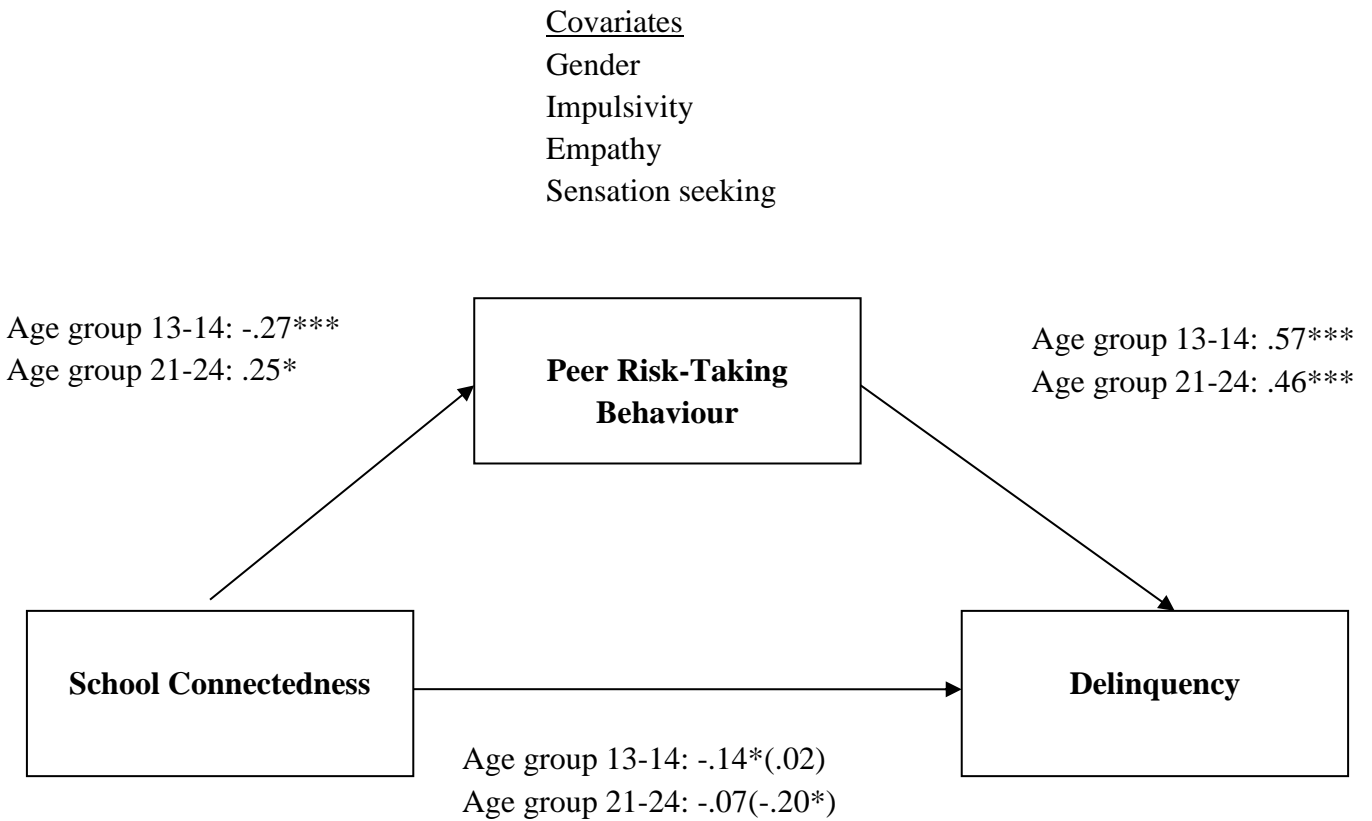


Figure 3. Mediating effects of the relationship between school connectedness and delinquency. Values are standardised regression coefficients. For the 13-14 age group final model, $R^2 = .52$, Adjusted $R^2 = .51$, $F(6, 184) = 33.45$, $p < .001$. For the 21-24 age group final model, $R^2 = .40$, Adjusted $R^2 = .37$, $F(6, 106) = 11.97$, $p < .001$. * $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates

Gender

Impulsivity

Empathy

Sensation seeking

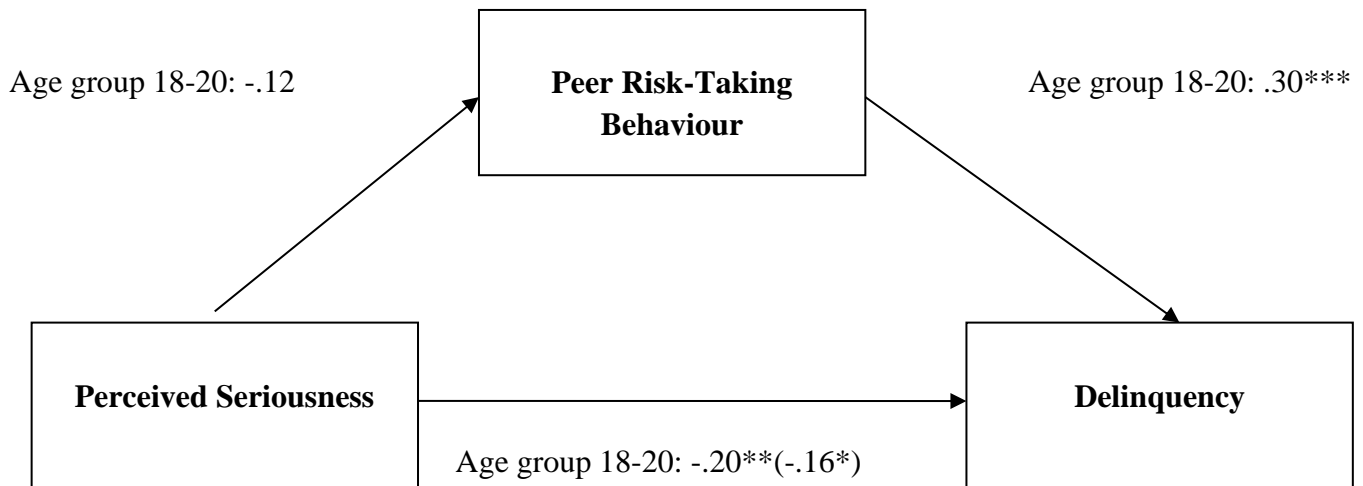


Figure 4. Mediating effects of the relationship between perceived seriousness of risk-taking behaviours and delinquency. Values are standardised regression coefficients. For the 18-20 age group final model, $R^2 = .29$, Adjusted $R^2 = .27$, $F(6, 211) = 14.14$, $p < .001$. * $p < .05$; ** $p < .01$; *** $p < .001$.