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Risk Factors and Risk-Based Protective Factors for Violent Offending: A Study of Young Victorians

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Abstract

Purpose—The present study aims to examine risk factors and risk-based and interactive protective factors for violent offending in a group of 437 young Australians.

Methods—Participants were recruited into the study when they were in Grade 5 (10-11 years) and followed up almost annually until young adulthood (18-19 years). Measures of violent offending, risk and protective factors, and demographics were obtained through a modification of the Communities That Care youth survey. The data collected enabled identification of groups of students at-risk of violent offending according to drug use, low family socioeconomic status, and antisocial behavior.

Results—Results showed that there were very few associations between the risk factors and risk-based protective factors measured in this study (e.g., belief in the moral order, religiosity, peer recognition for prosocial involvement, attachment to parents, low commitment to school, and poor academic performance) and later self-reported violent offending. There were no statistically significant interactive protective factors.

Conclusions—Further longitudinal analyses with large sample sizes are needed to examine risk factors and risk-based protective factors and interactive protective factors in at-risk groups. The findings support the need for multi-faceted prevention and early intervention approaches that target multiple aspects of youth's lives.

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Declaration of Conflicting Interests
None declared.

Keywords

violent offending; risk factors; risk-based protective factors; longitudinal study; cumulative risk index; cumulative protective index

Introduction

Youth violence, particularly violent offending, is a major health and social issue in many countries around the world (Katsiyannis, Ryan, Zhang, & Spann, 2008). The rate of juvenile offending has increased in Australia every year since 2004, with rates of assault increasing by 48% between the periods of 1996-97 and 2006-07 (Australian Institute of Criminology, 2009). There are a range of costs associated with violent offending for the offender, the victim, and the broader community. Progress has been made in understanding the risk factors for violent offending across a range of contexts including intra-individual, family, peer groups, schools, and communities. Less is known about the protective factors that may reduce the likelihood of violent offending and/or moderate the effect of risk factors on violent offending. The current paper will seek to add to the existing literature by examining changeable protective factors measured in late childhood and mid-adolescence for violent offending in late adolescence and young adulthood.

Risk and Protective Factors for Violent Offending

It has been noted that the terminology used in relation to risk and protective factors is not consistent in the literature (Lösel & Farrington, 2012). Protective factors are usually conceptualized as variables thought to mitigate the impact of risk factors on later outcomes. Risk factors are prospective predictors that increase the likelihood that an individual or group will engage in problem behaviors such as violent offending (National Crime Prevention, 1999). In the current article, the authors draw on the conceptualization of protective factors described by Farrington and Ttofi (2011), distinguishing between *risk-based* protective factors (factors that predict a low probability of negative outcomes such as violent offending) and *interactive* protective factors (factors that moderate the effects of risk factors (e.g., poor family management) on negative outcomes including violent offending; (Farrington & Ttofi, 2011)).

Modifiable risk and protective factors within the domains of the individual, peer group, family, school, and community have been linked to violent behavior in young people. Individual factors associated with violent behavior and offending include impulsivity (Herrenkohl et al., 2000; Vassallo et al., 2002), early concentration problems and hyperactivity (Hawkins et al., 2000; Hemphill et al., 2009), low achievement at school (Hemphill et al., 2011; Hemphill, Toumbourou, Herrenkohl, McMorris, & Catalano, 2006), low commitment to school (Hawkins et al., 2000; Herrenkohl, Lee, & Hawkins, 2012), belief in the moral order (Catalano & Hawkins, 1996), and attendance at religious activities (Herrenkohl et al., 2003). In the context of the peer group, interaction with prosocial peers is predicted to be associated with less violent offending (Catalano & Hawkins, 1996). It is well established that having antisocial and/or violent friends is associated with violent behavior (Hawkins et al., 2000; Hemphill et al., 2009). Within the family, conflict has been associated

with violent behavior (Hemphill et al., 2009), whereas good family management is linked with less violent and antisocial behavior (Herrenkohl et al., 2003; Sullivan, 2006). Finally, the Social Development Model (Catalano & Hawkins, 1996) postulates that bonding, opportunities to participate in prosocial activities, and recognition for prosocial activities in all contexts (peer group, family, school, community) are associated with less antisocial and violent behavior and engaging in prosocial behavior

The Present Study

Here, risk factors and risk-based and interactive protective factors measured in Grades 5 and 9 for self-reported violent offending in Grade 11 and young adulthood (18-19 years) were examined among an Australian sample. Analyses were completed separately for different groups at-risk for violent offending: drug users, participants from low socioeconomic status (SES) families, and participants who reported high levels of antisocial behavior in Grade 9. It was hypothesised that the risk factors and risk-based and interactive protective factors for violent offending would be similar across at-risk groups, and that these factors would span individual, peer, family, school, and community domains.

Method

Participants

Data from Victorian participants of the International Development Study (IYDS) were analysed in this study. The IYDS is a longitudinal study of antisocial and prosocial behaviours among adolescents in Victoria, Australia, and Washington State, United States (U.S.). The Victorian sample consisted of 927 (481 female, 446 male) students first surveyed in 2002 at age 10-11 years ($M = 11.0$, $SD = .41$). These students were re-surveyed in 2003-4, 2006-8, and 2010-12. Of the original sample, 791 (85%) completed the survey at age 16-17 years (367 males, 424 females; $M_{age} = 17.0$, $SD_{age} = 0.4$), and 809 (87%) completed the survey at age 18-19 years (365 males, 444 females). Original sampling and recruitment for the IYDS has been described elsewhere (McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007). Briefly, the IYDS used a two-stage cluster sampling approach: 1) random selection of public and private schools stratified according to geographic location, using a probability proportionate to grade-level size sample procedure; and 2) one class at each grade level (Grade 5, 7, and 9), within each school, was selected at random.

Measures

The self-report measures of violent offending, risk factors and risk-based protective factors, and demographic variables were contained within a modified version of the *Communities that Care (CTC)* survey used in the IYDS which has been adapted for use in Victoria (Hemphill et al., 2011). All risk and risk-based protective factors were scored so that high scores reflected greater occurrence of the outcome (e.g. poor academic performance, high opportunities for prosocial involvement in the family). Table 1 describes the scales measured, example items, Cronbach's alphas, and descriptive statistics.

Self-reported violent offending—Participants were asked how often they had engaged in various types of violent offending over their lifetime (Grade 5) and in the past year

(Grades 9, 11, and young adulthood). At Grade 5, participants were asked two questions: 1) if they had beat up someone so badly that they probably needed to see a doctor or nurse, and 2) attacked someone with the idea of seriously hurting them. At Grades 9 and 11 and in young adulthood, participants were asked the two items measured in Grade 5, in addition to the item: “How many times in the past year have you threatened someone with a weapon?” At each timepoint, responses were recoded to give participants a score of 0 if they answered *Never* and a score of 1 if they reported engaging in violent behavior *one or more* times, allowing a distinction to be made between participants who had and had not engaged in violent behaviour.

Risk factors and risk-based protective factors—Risk factors and risk-based protective factors spanned the individual, family, peer group, school, and community domains. All factors were dichotomized similar to previous analyses of this nature (e.g. Hemphill, Tollit, & Herrenkohl, 2014), to identify high levels of ‘protection’ (scored as 1). For variables originally classified as protective factors, the top quartile (75%) was used as the scale cut-point and responses were coded 0 if they fell into the bottom quartile (25%), and 1 if they fell into the top quartile (75%). For variables originally classified as risk factors, the bottom quartile (25%) was used as the scale cut-point and responses were coded 0 if they fell into the top quartile (25%), and 1 if they fell into the bottom quartile (75%).

At-risk groups—Risk factors and risk-based protective factors were examined for three at-risk groups, defined on behaviour (drug use and engagement in antisocial behaviour) or personal circumstance (family SES).

Drug use was assessed in Grade 5 (lifetime use) and Grade 9 (past month use). In Grade 5, participants were asked if they had used alcohol (“have you ever had more than just a sip or two of an alcoholic drink (like beer, wine, or liquor/spirits)”) or tobacco (“have you ever smoked a cigarette, even just a puff”) in their lifetime. In Grade 9, participants were asked how often in the past month they had: smoked cigarettes; had more than just a few sips of an alcoholic beverage (like beer, wine or liquor/spirits); used marijuana (pot, weed, grass); and used other drugs (LSD, cocaine, inhalants, stimulants, ecstasy, heroin, and other illegal drugs). Participants were also asked about binge drinking over the last fortnight using the item “How many times have you had five or more drinks in a row” Responses to all substance use measures were recoded to give participants a score of 0 if they answered ‘*never*’ to all questions and a score of 1 if participants reported engaging in any type of drug use *one or more* times, allowing a distinction to be made between participants who had and had not engaged in drug use (lifetime for Grade 5, and past month for Grade 9).

Antisocial behavior: An at-risk group based on antisocial behavior in Grade 5 could not be formed due to the small number of cases identified. In Grade 9, participants were asked about five types of antisocial behaviour: carried a weapon; stolen something worth more than \$10; sold illegal drugs; stolen or tried to steal a motor vehicle; and been drunk or high at school. Responses were recoded to give participants a score of 0 if they answered ‘*never*’ on all items and a score of 1 if participants reported engaging in any antisocial behavior *one or more* times, allowing a distinction to be made between participants who had and had not engaged in antisocial behaviour in their lifetime (Grade 5) or past year (Grade 9).

Family SES: Parent-reported level of socio-economic (dis)advantage was assessed in Grade 5. Parents reported their highest level of education (mother and father) (e.g., less than secondary school, completed secondary school, completed post-secondary school, other) and level of family income (ranging from 'less than \$10,000' to '\$200,00 and above').

Procedure

Ethics approval for this study was obtained from The University of Melbourne Human Ethics in Research Committee and relevant educational authorities. The survey required approximately 50-60 minutes to complete, and was administered within the students' classroom setting for data collection during Grades 5-11. Students no longer attending school during the follow-up surveys, or who were absent on the day of the survey, were surveyed individually by trained personnel. For each student participant, both parental written informed consent and student assent were obtained. For the young adult survey, the participants completed surveys individually, online, after providing informed consent. As an alternative to the online survey, participants could request a telephone interview or a hard copy survey to be returned by post. After each survey, participants received a small gift.

Student honesty

Drawn from early studies of the development and validity of the *Communities That Care* youth survey (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002), items were included to assess whether or not students answered the survey questions honestly. Students were categorized as dishonest if they reported any of the following: (1) that they were not honest at all when filling out the survey; (2) that they had used a fake drug in their lifetime or in the past 30 days; or (3) that they had used illicit drugs on more than 120 occasions in the past 30 days. A single, dichotomous measure of honesty was calculated using these items.

Statistical Analyses

Data analyses were performed using Stata/IC 13.1 for Windows (StataCorp, 2013) for participants with complete data on all analyzed variables and those who did not meet the criteria for dishonesty ($n = 65$). First, partially adjusted logistic regression analyses were performed to examine associations between risk factors and risk-based protective factors at Grade 5 and 9 and engagement in violent offending in Grade 11 and in young adulthood.

Analyses were conducted separately for each of the three at-risk groups (drug use, antisocial behavior, family SES). The partially adjusted analyses controlled for age, gender, and the clustering of students in schools (using robust 'information-sandwich' estimates of standard errors).

Next, dichotomized scores for each factor were summed to create a total risk and protective factor score (i.e., a cumulative measure of risk and risk-based protective factors) at Grade 5 and 9. Partially adjusted analyses (controlling for age, gender, and the clustering of students in schools) were conducted to examine associations between total risk and protective factor scores and later engagement in violent offending.

In the final analysis step, the influence of interactive protective factors on later violent offending was examined. For statistically significant risk factors and risk-based protective factors in the partially adjusted logistic regression analyses, all possible combinations of interactions at Grade 5 and 9 were examined as predictors of engagement in violent offending in Grade 11 and in young adulthood. Statistically significant risk factors and risk-based protective factors were multiplied by one another at the corresponding grade level (5 or 9) and for the relevant risk group. Statistically significant interaction terms were retained and added as a final step in the partially adjusted logistic regression analyses described above.

Results

Rates of Violent Offending, At-Risk Groups, and Risk Factors and Risk-Based Protective Factors

Table 1 presents the rates of violent offending at Grade 11 and young adulthood, and at-risk groups and risk/protective factors in Grades 5 and 9. Rates of engagement in violent offending were four times greater in young adulthood compared to that in Grade 11 (27% and 6% respectively). For at-risk groups, rates of drug use were higher in Grade 9 compared to Grade 5.

Risk Factors and Risk-Based Protective Factors for Violent Offending

Results of partially adjusted logistic regression models testing longitudinal associations between Grade 5 risk factors and risk-based protective factors and violent offending in Grade 11 and young adulthood are presented in Table 2 for two at-risk groups (i.e., drug use, living with low SES family). None of the Grade 5 factors were predictive of violent offending in Grade 11 for participants in the drug use at-risk group. For participants living in a low SES family, interaction with prosocial peers was the only Grade 5 factor associated with Grade 11 violent offending. With regard to violent offending in young adulthood, Grade 5 belief in the moral order was the only predictor among the at-risk drug use group, while Grade 5 religiosity was the only predictor among the at-risk low family SES group.

Table 3 presents the results from partially adjusted logistic regression analyses testing longitudinal associations between Grade 9 risk factors and risk-based protective factors and violent offending in Grade 11 and young adulthood, for the three at-risk groups (i.e., drug use, high antisocial behavior, low family SES). For the at-risk high drug use group, recognition for prosocial involvement in the family in Grade 9 showed a small, but statistically significant, association with decreased violent offending in Grade 11. For this at-risk group, both belief in the moral order and high parent attachment decreased the risk of young adult violent offending, while low commitment to school showed a two-fold increase in risk for young adult violent offending. For the at-risk group reporting high antisocial behaviour in Grade 9, no factors showed statistically significant associations with violent offending in Grade 11. Low academic performance in Grade 9 increased the odds of violent offending by over ten times in young adulthood. Finally, for the at-risk low SES group, community recognition for prosocial involvement was associated with an increased risk of

Grade 11 violent offending. There were no statistically significant predictors of young adult violent offending for this group.

Cumulative Risk and Protective Scores and Later Violent Offending

Table 4 presents the findings from partially adjusted associations between the cumulative risk and protective scores in Grades 5 and 9 and violent offending in Grade 11 and young adulthood. For the high drug use risk group at Grade 5, neither of the cumulative risk and protective scores was associated with Grade 11 or young adult violent offending. At Grade 9, for this at-risk group, the cumulative risk score was associated with over a thirty times greater odds of Grade 11 violent offending, while the cumulative protective score showed a small, but statistically significant association, with decreased violent offending in both Grade 11 and young adulthood. For participants in the at-risk low family SES group in Grade 5, the Grade 5 cumulative protective score was associated with decreased odds for young adult violent offending. Further, for this at-risk group the Grade 9 cumulative risk score was associated with increased odds for violent offending in young adulthood but not Grade 11. Finally, for the high antisocial behavior at-risk group in Grade 9, neither of the cumulative risk and protective scores was associated with violent offending at Grade 11 or young adulthood.

Interactive Protective Factors

Tests of interactive protective factors (specifically Grade 9 belief in the moral order*low commitment to school, for the high drug use at-risk group, and parent attachment*low school commitment for the high drug use at-risk group) did not reveal any statistically significant interactions.

Discussion

The current study analyzed longitudinal data spanning eight years with detailed measures of risk factors and risk-based protective factors to demonstrate that the risk factors and risk-based protective factors, not surprisingly, differed for different at-risk groups at different ages. There were few associations between Grade 5 factors and Grade 11 and young adult offending. There were more associations between Grade 9 factors and Grade 11 and young adult offending, than for Grade 5. Likewise, for cumulative risk and protective factor indices, of the ten models tested, the cumulative risk factor score predicted later violent offending in two models and cumulative protective factors predicted subsequent violent offending in three models. Even across the shortest timeframe measured in the current study from Grade 9 to Grade 11, there were few predictors identified.

Of all the sixteen Grade 5 risk factors and risk-based protective factors examined, only three were predictors for Grade 11 and young adult offending; one for the high drug use group and two for the low family SES group. Two of the factors reduced the likelihood of later violent offending (belief in the moral order, religiosity). Belief in the moral order has been identified as a protective factor for antisocial behavior in previous studies, as has religiosity (Catalano & Hawkins, 1996; Herrenkohl et al., 2003). There was an unexpected finding with interaction with prosocial friends in Grade 5 increasing the odds of Grade 11 violent

offending. However, the correlation between the two items in this scale was only 0.3, suggesting that students of this age could not reliably report whether their best friends tried to do well in school and participated in sports, clubs, organizations or other activities at school, indicating that this measure was not reliable for students of this age.

In the present study, there were six associations between Grade 9 risk factors and risk-based protective factors and Grade 11 and young adult violent offending. Most of the associations were found for the Grade 9 high drug use group; peer recognition of prosocial involvement reduced the odds of Grade 11 violent offending and for young adult violent offending, protective factors were belief in the moral order and attachment to parents, whereas low commitment to school increased the odds of young adult violent offending. Belief in the moral order and attachment to parents have both been identified as protective against violence in previous research (Catalano & Hawkins, 1996). There is an established literature demonstrating that low commitment to school is associated with later violence (e.g., Hawkins et al., 2000; Herrenkohl et al., 2012). Only one predictor was found for the Grade 9 high antisocial behavior group and that was poor academic performance increasing the odds of young adult violent offending. Again, this finding has been reported previously in the literature (Hemphill et al., 2011; Hemphill et al., 2006). Finally, for the low family SES group, Grade 9 community recognition for prosocial involvement *increased* the odds of Grade 11 violent offending. This finding contradicts the predictions in the Social Development Model (Catalano & Hawkins, 1996) that being recognized in the local community for prosocial behavior reduces the likelihood of engaging in violent offending and antisocial behavior more generally. Perhaps when living in a low SES family and therefore possibly a high crime area, recognition by neighbors may not necessarily promote prosocial behavior.

Results showed that the cumulative risk and protective factor scores were associated with Grade 11 and young adult violent offending in some of the at-risk groups. The Grade 5 protective factor score reduced the odds of young adult violent offending for the low family SES group, and the Grade 9 protective factor score reduced the likelihood of Grade 11 and young adult violent offending for the Grade 9 high drug use group. The Grade 9 risk factor score was associated with a large increased risk of Grade 11 violent offending for the Grade 9 high drug use group. Similarly the Grade 9 risk factor score was associated with a large increased risk of young adult violent offending for the low family SES group. Other studies have previously reported that cumulative risk and protective factor scores are predictors of outcomes such as violent behavior (Herrenkohl et al., 2003; Herrenkohl et al., 2000).

Strengths and Limitations of the Current Study

The present study has several strengths. The recruited sample was state-representative at the commencement of the ongoing longitudinal study in 2002. The longitudinal study also achieved good response rates for participation, it included approximately equal numbers of male and female students, and it has achieved a good sized sample with strong retention across the eight years of the study. The present study analyzed data from this existing longitudinal study that has detailed data on risk factors and risk-based protective factors. It

therefore provides a unique opportunity to examine the prospective predictors of violent offending at different ages and for different at-risk groups.

The current study also has several limitations. The number of cases in some at-risk groups was small and this impacted on the analyses with some models not converging and wide confidence intervals found for associations that were detected. Some results therefore need to be interpreted with caution. Second, the measure of violent offending was based on self-reports of participants. However, the use of self-report measures in studies of pre-adolescents and adolescents is considered a reliable source of data for behavior problems such as substance use and antisocial behavior (Huizinga & Elliott, 1986; Jolliffe et al., 2003; Rutter & Giller, 1983) that are not readily visible to adults. In addition, official statistics generally provide conservative estimates given that there a number of points at which young people may or may not proceed to be counted as a “case”. In addition, there are also many errors that occur in the processing of offences that affect the reliability of the rates reported. Third, the present study examined the associations between earlier risk factors and risk-based protective factors and subsequent violent offending. Research is also needed to investigate associations from early violent behavior to subsequent risk factor and risk-based protective factor exposure, as well as reciprocal relationships between violent behavior/offending and factors.

There is debate in the literature about what constitutes a risk or protective factor and whether they are separate or part of a single underlying dimension of behavior (or surrounding context) modeled at opposite ends of that one dimension. For example, emotion control is considered protective if scored to reflect more of the skills that contribute to emotion control. Emotion control might also be considered a risk factor if scored to reflect low skill or the absence of control. Other variables are theoretically derived and are hypothesized to influence developmental outcomes as separable risk or protective factor influences (e.g., opportunities and recognition for prosocial involvement at school as distinct from opportunities and recognition for antisocial involvement at school). It is important for the reader to note that in analyses here, we have chosen to include variables that fall within both categories; those that are uniquely antisocial or prosocial according to the Social Development Model (Catalano & Hawkins, 1996), as well as those that could be conceptualized as risk and/or protective factors depending on how they are operationalized and scored.

Implications of the Findings for Future Research

In the current literature, interactive protective factors have rarely been investigated (Farrington & Ttofi, 2012). Interaction effects can be difficult to detect when analyses are underpowered (Maxwell, 2004). More longitudinal studies with large sample sizes are required in the future to continue to examine the potential role of interactive protective factors in reducing violent offending.

Given the ongoing debate about how best to conceptualize and measure risk and protective factors, additional studies of risk factors and risk-based protective factors for violent offending are needed to further elucidate the influence of risk and protective factors measured in a variety of ways. An improved understanding of this kind will result in

prevention and early intervention approaches that are more likely to be effective in reducing violent offending.

Conclusions

The present study of risk factors and risk-based and interactive protective factors identified a few notable predictors of later violent offending that spanned the individual, peer, and community domains. Belief in the moral order was found to reduce the odds of violent offending at Grade 5 and Grade 9. The results of the current study demonstrated the importance of considering risk/protective factors for different at-risk groups at different ages. More research of this kind with sufficient sample sizes to conduct subgroup analyses is warranted. Ongoing consideration of the conceptualization and measurement of risk and protective factors in this (and related) field(s) of research is vital to continue to progress developmental models of violent offending and related behaviors that can then be used to inform prevention and early intervention approaches for young people.

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Highlights

- Risk factors and risk-based protective factors spanned individual, peer, and family contexts.
- Interactive protective factors were not detected in this study.
- More associations with offending were found for Grade 9 (versus Grade 5) factors.
- There were associations between cumulative risk/protective scores and offending.

Descriptive statistics and rates of Grade 5 and 9 risk factors and risk-based protective factors, at-risk groups, and violent offending in Grade 11 and young adulthood ($n = 437$).

Table 1

No. of scale items	Responses	Cronbach's alpha (G5, G9)	Grade 5		Grade 9	
			Low (n)	High (%)	Low (n)	High (%)
<i>Individual factors</i>						
4	1-4 (definitely no to definitely yes)	.56, .69	267	61.10	170	38.90
	Belief in the moral order (e.g., I think it is okay to take something without asking if you can get away with it)			261	176	59.73
	Religiosity (e.g., How often do you attend religious services or activities?)			232	205	53.09
2	1-4 (never to once a week or more)	n/a, .83	303	69.34	134	30.66
	Interaction with prosocial peers (e.g., How many of your best friends have tried to do well in school?)			309	128	70.71
2	1-5 (no to very good chance)	.30, .45	266	60.87	171	39.13
	Recognition for prosocial involvement (e.g., What are the chances you would be			236	201	54.00
		.41, .38	320	73.23	117	26.77
				46.0	29.2	46.0

	No. of scale items	Responses	Cronbach's alpha (G5, G9)	Grade 5		Grade 9			
				Low (n)	High (%)	Low (n)	High (%)		
seen as cool if you worked hard at school?)									
Poor academic performance (e.g., Are your school grades better than the grades/mark s of most students in your class?)	2	1-4 (definitely no to definite ly)	.44, .66	81	18.54	88	20.14	349	79.86
Low commitment to school (e.g., How often do you feel that the schoolwork you are assigned is meaningful and important?)	7	1-5 (never to almost always)	.69, .78	73	16.70	144	32.95	293	67.05
High impulsivity (e.g., It's important to think before you act)	3	1-4 (definitely no to definite ly yes)	.53, .55	95	21.74	139	31.81	298	68.19
<i>Family factors</i>									
Parent attachment (e.g., Do you feel very close to your father?)	4	1-4 (definitely no to definite ly)	.70, .79	290	66.36	316	72.31	121	27.69

No. of scale items	Responses	Cronbach's alpha (G5, G9)	Grade 5		Grade 9		High (%)	High (n)	Low (%)	Low (n)	High (%)	High (n)
			Low (%)	Low (n)	High (%)	High (n)						
3	Opportunities for prosocial involvement (e.g., If I had a personal problem, I could ask my mum or dad for help)	.65, .77	68.42	299	31.58	371	92.06	32	7.94			
4	Recognition for prosocial involvement (e.g., My parents notice when I am doing a good job and let me know about it)	.63, .77	62.01	271	37.99	280	64.07	157	35.93			
9	Poor family management (e.g., The rules in my family are clear)	.70, .82	22.20	97	77.80	93	21.28	344	78.72			
3	Family conflict (e.g., People in my family have serious arguments (reverse coded))	.80, .81	20.59	90	79.41	121	27.69	316	72.31			
5	School factors Opportunities for prosocial involvement	.49	75.06	328	24.94	320	73.23	117	26.77			

No. of scale items	Responses	Cronbach's alpha (G5, G9)	Grade 5		Grade 9	
			Low (n)	High (%)	Low (n)	High (%)
4	(e.g., I have lots of chances to be part of class discussions or activities) Recognition for prosocial involvement (e.g., The school lets my parents know when I have done something well)	.62, .71	258	59.04	312	71.40
				179	40.96	125
5	<i>Community factors</i> Opportunities for prosocial involvement (e.g., There are lots of adults in my neighbourhood I could talk to about something important)	.65, .66	322	73.68	298	68.19
				115	26.32	139
3	Recognition for prosocial involvement (e.g., There are people in my neighbourhood who are proud of me when I do something well)	.85, .71	297	67.96	318	72.77
				140	32.04	119

Risk groups	No. of scale items	Response options	Grade 5		Grade 9	
			Low (n)	High (n) (%)	Low (n)	High (n) (%)
Drug use (e.g., smoked cigarettes; had more than just a few sips of an alcoholic beverage (like beer, wine or liquor/spirits); used marijuana (pot, weed, grass); used other drugs (LSD, cocaine, inhalants, stimulants, ecstasy, heroin, and other illegal drugs) and binge drinking)	5	1-8 (never to 40 times or more)	222	215 49.20	173	264 60.41
Antisocial behaviour (e.g., How many times in the past year (12 months) have you carried a weapon?)	2	1-8 (never to 40 times or more)	-	-	373 85.35	64 14.65
Family socio-economic status (e.g., Parent highest level)	2	n/a	340	78 18.66	-	-
			81.34			

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No. of scale items	Responses	Cronbach's alpha (G5, G9)	Grade 5		Grade 9	
			Low (n)	High (%)	Low (n)	High (%)
	of education and level of family income (e.g. less than \$10,000)).					
	<i>Violent offending</i>		Low (n, %)		High (n, %)	
2	Grade 5 (e.g., Have you ever beat up someone so badly that they probably needed to see a doctor or nurse?)	.42	396, 90.62		41, 9.38	
2	Grade 9 (e.g., How many times in the past year have you threatened someone with a weapon?)	.70	397, 90.85		40, 9.15	
2	Grade 11 (e.g., How many times in the past year have you threatened someone with a weapon?)	.79	407, 93.14		30, 6.86	
2	Young adulthood (e.g., How many times in the past	.67	317, 72.54		120, 27.46	

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No. of scale items	Response options	Cronbach's alpha (G5, G9)	Grade 5		Grade 9	
			Low (n)	High (%)	Low (n)	High (%)
1	year have you threatened someone with a weapon?					

Note.

^a = Religiosity comprised 1 item at Grade 5, thus Cronbach's alpha has not been calculated.

Table 2

Associations between risk factors and risk-based protective factors in Grade 5 and violent offending in Grades 11 and young adulthood.

Risk Group	Grade 5 high drug use (n = 215)		Grade 5 low family socio-economic status (n = 78)	
	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]
<i>Grade 5 Individual factors</i>				
Belief in the moral order	.37 [.07, 1.89]	.36** [.18, .74]	-	.26 [.06, 1.06]
Religiosity	.37 [.08, 1.69]	.76 [.40, 1.46]	.53 [.07, 3.87]	.34* [.13, .88]
Interaction with prosocial peers	1.58 [.64, 2.36]	.76 [.44, 1.33]	5.14* [1.08, 24.57]	.40 [.12, 1.32]
Recognition for prosocial involvement	1.31 [.42, 4.07]	.76 [.33, 1.72]	.43 [.07, 2.79]	.78 [.25, 2.45]
Poor academic performance	.60 [.18, 2.04]	1.31 [.71, 2.41]	-	3.24 [.74, 14.13]
Low commitment to school	.78 [.16, 3.81]	1.37 [.43, 4.31]	-	-
High impulsivity	2.73 [.33, 22.57]	.88 [.42, 1.85]	2.04 [.18, 23.05]	1.60 [.40, 6.42]
<i>Grade 5 Family factors</i>				
Parent attachment	.56 [.17, 1.87]	.88 [.47, 1.67]	.69 [.11, 4.23]	.64 [.21, 2.00]
Opportunities for prosocial involvement	1.12 [.33, 3.80]	1.04 [.52, 2.10]	1.76 [.31, 10.05]	1.18 [.43, 3.27]
Recognition for prosocial involvement	1.11 [.36, 3.47]	.90 [.44, 1.82]	1.11 [.21, 5.88]	.30* [.11, .80]
Poor family management	.73 [.30, 1.79]	1.10 [.59, 2.04]	-	.83 [.21, 3.30]
Family conflict	.49 [.13, 1.79]	1.11 [.52, 2.40]	.49 [.06, 3.78]	1.63 [.37, 7.29]
<i>Grade 5 school factors</i>				
Opportunities for prosocial involvement	1.59 [.45, 5.56]	1.03 [.51, 2.05]	4.66 [.87, 24.85]	1.24 [.37, 4.18]
Recognition for prosocial involvement	1.12 [.40, 3.15]	1.05 [.58, 1.91]	.99 [.18, 5.51]	1.12 [.39, 3.17]
<i>Grade 5 Community factors</i>				
Opportunities for prosocial involvement	.84 [.23, 3.05]	1.13 [.60, 2.13]	2.84 [.46, 17.76]	1.14 [.31, 4.15]
Recognition for prosocial involvement	1.32 [.44, 3.92]	.85 [.49, 1.46]	3.54 [.39, 31.87]	.92 [.19, 4.50]

Note. OR = odds ratio. CI = confidence interval. - = analyses would not run due to small number of cases available. Analyses controlled for age, gender, and clustering of students in the schools at Grade 5.

* = $p < 0.05$,

** = $p < 0.01$

Table 3

Associations between risk factors and risk-based protective factors in Grade 9 and violent offending in Grades 11 and young adulthood.

	Grade 9 high drug use (n = 264)		Grade 9 high antisocial behaviour (n = 64)		Grade 5 low family socio- economic status (n = 78)	
	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]
<i>Grade 9 Individual factors</i>						
Belief in the moral order	.36 [.08, 1.64]	.38** [.19, .77]	-	-	.25 [.03, 2.00]	.30* [.11, .79]
Religiosity	.62 [.20, 1.89]	.83 [.44, 1.54]	1.05 [.32, 3.43]	.46 [.14, 1.50]	.48 [.07, 3.19]	.50 [.17, 1.52]
Interaction with prosocial peers	.50 [.16, 1.51]	.91 [.50, 1.65]	1.66 [.42, 6.61]	.98 [.28, 3.47]	.72 [.08, 6.87]	.65 [.16, 2.60]
Recognition for prosocial involvement	.12** [.03, .56]	.98 [.57, 1.67]	.50 [.12, 2.14]	.95 [.33, 2.72]	-	.76 [.29, 2.01]
Poor academic performance	3.32 [.41, 27.19]	1.45 [.67, 3.16]	-	10.86* [1.32, 89.65]	-	3.80 [1.05, 13.80]
Low commitment to school	-	2.31** [1.36, 3.92]	3.32 [.37, 29.91]	2.17 [.55, 8.49]	-	2.01 [.64, 6.27]
High impulsivity	3.03 [.72, 12.73]	1.28 [.60, 2.71]	.62 [.13, 2.84]	.51 [.11, 2.28]	1.27 [.21, 7.52]	2.41 [.75, 7.79]
<i>Grade9 Family factors</i>						
Parent attachment	.45 [.14, 1.50]	.52* [.27, .99]	1.46 [.36, 5.94]	1.88 [.30, 12.02]	.60 [.06, 6.27]	1.05 [.28, 3.95]
Opportunities for prosocial involvement	-	.43 [.11, 1.70]	3.66 [.35, 38.53]	1.16 [.11, 12.27]	-	1.16 [.13, 10.09]
Recognition for prosocial involvement	.64 [.22, 1.85]	.65 [.37, 1.15]	2.50 [.84, 7.49]	1.22 [.37, 4.08]	1.21 [.19, 7.76]	.4 [.25, 2.18]
Poor family management	1.43 [.34, 6.04]	1.36 [.60, 3.11]	.79 [.19, 3.38]	2.55 [.65, 10.07]	.21 [.04, 1.17]	2.28 [.48, 10.91]
Family conflict	1.67 [.48, 5.79]	1.08 [.54, 2.16]	.99 [.25, 3.97]	1.20 [.28, 5.16]	2.45 [.27, 22.56]	2.24 [.71, 7.04]
<i>Grade 9 school factors</i>						
Opportunities for prosocial involvement	.38 [.09, 1.55]	.73 [.36, 1.49]	1.30 [.22, 7.87]	.38 [.06, 2.20]	.91 [.09, 8.88]	1.23 [.33, 4.55]
Recognition for prosocial involvement	.40 [.10, 1.72]	1.10 [.57, 2.11]	1.87 [.45, 7.72]	.83 [.21, 3.19]	-	1.49 [.46, 4.81]

	Grade 9 high drug use (n = 264)		Grade 9 high antisocial behaviour (n = 64)		Grade 5 low family socio- economic status (n = 78)	
	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]
<i>Grade 9 Community factors</i>						
Opportunities for prosocial involvement	.64 [.25, 1.65]	.86 [.51, 1.47]	1.93 [.45, 8.26]	2.83 [.69, 11.55]	1.37 [.22, 8.70]	.86 [.33, 2.23]
Recognition for prosocial involvement	1.30 [.54, 3.16]	.84 [.48, 1.49]	3.52 [.88, 14.10]	1.38 [.38, 4.95]	6.79* [1.09, 42.11]	1.14 [.33, 4.01]

Note. OR = odds ratio. CI = confidence interval. - = analyses would not run due to small number of cases available. Analyses controlled for age, gender, and clustering of students in the schools at Grade 5 and Grade 9.

* = $p < 0.05$,

** = $p < 0.01$.

Table 4

Associations between cumulative risk factor and protective factor scores in Grades 5 and 9 and violent offending in Grades 11 and young adulthood

	Grade 5 high drug use (n = 264)		Grade 5 low family socio-economic status (n = 78)			
	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]		
<i>Risk/Protective factor score</i>						
Grade 5 risk score	.30 [.01, 6.26]	1.74 [.35, 8.59]	46.30 [.05, 44902.72]	13.40 [.54, 330.54]		
Grade 5 protective score	.89 [.05, 14.62]	.48 [.13, 1.74]	3.41 [.06, 206.00]	.07* [.01, .89]		
	Grade 9 high drug use (n = 264)		Grade 9 high antisocial behaviour (n = 64)		Grade 5 low family socio-economic status (n = 78)	
	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]	Grade 11 violent offending OR [95% CI]	Young adult violent offending OR [95% CI]
<i>Risk/Protective factor score</i>						
Grade 9 risk score	33.46* [1.87, 597.67]	2.99 [.82, 10.93]	3.32 [.32, 33.90]	5.58 [.57, 54.98]	4.31 [.23, 81.58]	14.82* [1.60, 136.96]
Grade 9 protective score	.02** [.003, .22]	.28* [.08, .96]	4.51 [.30, 67.43]	.60 [.04, 9.54]	.08 [.003, 2.27]	.28 [.03, 2.82]

Note. OR = odds ratio. CI = confidence interval. Analyses controlled for age, gender, and clustering of students in the schools at Grade 5 and Grade 9.

* = $p < 0.05$,

** = $p < 0.01$