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Modifiable determinants of youth violence in Australia and the United States: A longitudinal study

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Abstract

Youth violence is a global problem. The major research into youth violence has been conducted in the United States (U.S.) and there has been little research to investigate whether the prevalence or predictors are similar in comparable Western countries like Australia. In the current paper, analyses are conducted using two waves of data collected as part of a cross-national longitudinal study of adolescent development in approximately 4000 students aged 12 to 16 years in Victoria, Australia and Washington State, U.S.. Students completed a self-report survey of problem behaviours including violent behaviour, as well as risk and protective factors across five domains (individual, family, peer, school, community).

Compared to Washington State, rates of attacking or beating another over the past 12-months were lower in Victoria for females in the first survey and higher for Victorian males in the follow-up survey. Preliminary analyses did not show state-specific predictors of violent behaviour. Therefore, the final multivariate model included the combined Washington State and Victorian samples. In the multivariate model, protective factors were being female and student emotion control. Risk factors were prior violent behaviour, family conflict, association with violent peers, community disorganisation, community norms favourable to drug use, school suspensions, and arrests. A major implication of these findings is that the range of factors that influence violent behaviour in North America may also apply in Australia. Hence, the application of U.S. early

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intervention and prevention programs may be warranted, with some tailoring to the Australian context.

Youth violence is a global problem that is costly to societies around the world (Herrenkohl et al., 2000; Rutherford, Zwi, Grove, & Butchart, 2007; World Health Organization, 2002). Costs of violence stem from harm caused to victims (e.g., medical expenses, absence from school or work, psychological harm) as well as policing and criminal justice responses and perceived safety in the community (World Health Organization, 2002, 2004). There is an upsurge in the rates of violence as young people leave childhood and enter adolescence (Elliott, 1994; Farrington et al., 1990). Understanding how youth violence develops is crucial for effective prevention and early intervention. To date, much of the longitudinal research on the factors that influence the development of youth violence has been conducted in the United States (U.S.). This research sets a strong foundation, yet it is important to broaden the research focus to include other countries to examine universal and context-specific influences. This study compares the predictors of youth violence in an Australian state (Victoria) and the U.S. state of Washington.

International comparisons of adolescent violent behaviour

The majority of studies on both the development of violent behaviour and evidence-based approaches to the prevention of violent behaviour have been conducted in North America. Examining the similarities and differences in the development of violent behaviour across North America and other countries may therefore have important implications for applicability of prevention approaches around the world. International comparative studies are also essential to distinguish between universal and context-specific influences on behaviour across countries and cultures (Jessor et al., 2003; Unger et al., 2002). Cross-national studies of adolescence can make significant contributions to the field (Hosman & Clayton, 2000) because comparisons identify similarities and differences in levels of adolescent behaviours (Denny, Clark, & Watson, 2003), and allow investigation of underlying factors that explain differences in prevalence. Nations with differing cultural and political environments are of substantial research interest.

In general, previous international comparison studies of problem behaviour have relied on opportunistic use of existing data sets. In one example, Pirkis, Irwin, Brindis, Patton, and Sawyer (2003) compared substance use data from 14- to 17-year-olds in the 1999 U.S. Youth Risk Behavior Survey, the 1998 U.S. National Household Survey on Drug Abuse and the 1998 National Survey of Mental Health and Wellbeing Australia. The findings varied depending on the U.S. data set used, with Australian adolescents either less likely to report smoking cigarettes, drinking, and using marijuana or to report no differences from their American counterparts. Based on these discrepancies, Pirkis et al. (2003) concluded that future international collaborations should focus on consistency of methods, including the use of surveys that are identical in design and implementation.

For adolescent antisocial behaviour, including violence, there are few well-designed international comparisons; some previous studies show similarities in rates of antisocial behaviour and related behaviours and others report differences (Bond, Thomas, Toumbourou, Patton, & Catalano, 2000; Junger-Tas, Terlouw, & Klein, 1994; Rutter, Giller, & Hagell, 1998; Smith-Khuri et al., 2004; Vazsonyi, Trejos-Castillo, & Huang, 2007). Recent studies using matched recruitment and data collection and data management methods show that in general rates of youth violence are similar in Australia and the U.S. (Hemphill et al., 2007; McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007), although there are country differences in individual violent behaviours. For example, more Victorian than Washington State Grade 5 boys report that they have attacked someone to seriously hurt

them, whereas more Washington State Grade 7 boys have carried a hand gun (Hemphill et al., 2007; McMorris et al., 2007).

In relation to the predictors of violent behaviour, studies from North America, the United Kingdom and New Zealand show similarities across a broad range of influences (within the young person, and his/her family, peer group, school, and community) (Hawkins et al., 2000). Junger-Tas, Marshall, and Ribeaud (2003) found that relationships with parents were related to serious delinquency and to drug use in Anglo-Saxon, Southern European and North-West European countries. However, some differences in the importance of specific predictors have also been found. For example, Junger-Tas et al. (2003) noted that father absence was closely associated with delinquent behaviour in Anglo-Saxon and Southern European countries but not in North-West Europe.

Theoretical models of the development of violent and related behaviours

A common approach to studying the development of violent behaviour is to examine the impact of risk and protective factors on behaviour. *Risk factors* are prospective predictors that increase the likelihood that an individual or group will engage in adverse outcomes (Hawkins, Catalano, & Miller, 1992; National Crime Prevention, 1999). *Protective factors* both directly decrease the likelihood of antisocial behaviour (Jessor, Turbin, & Costa, 1998; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995) and mediate or moderate the influence of risk factors (Garmezy, 1985; Rutter, 1985).

The theory informing the research presented in this paper is the Social Development Model (SDM) (Catalano & Hawkins, 1996). Consistent with ecological perspectives, the SDM organises risk and protective factors according to their influence in different developmental settings including communities, families, schools, peer groups, and within individuals (Hawkins et al., 1992). The SDM integrates the main features of social control, social learning, and differential association theories of crime and delinquency and postulates that antisocial behaviour (including violent behaviour) originates with unhealthy beliefs and unclear standards, as well as bonds of attachment to deviant peers and others involved in antisocial behaviour (e.g., family members and/or neighbours). Whether behaviour is antisocial (e.g., violent) or prosocial depends on the preponderance of perceived prosocial or antisocial opportunities, involvements, and perceived rewards.

The SDM and other ecological theories emphasize the importance of a wide range of social and contextual influences. Community risk factors include legal and normative expectations for behaviour and indicators of neighbourhood disorganisation. Family conflict and family history of antisocial behaviour are exemplars of family level risk factors. Within the school setting, academic failure and low commitment are influential. Individual and peer factors include lack of impulse control, association with antisocial peers, and early involvement in problem behaviour (Hawkins et al., 1998; Herrenkohl et al., 2000; Vassallo et al., 2002). Protective factors at the family, school and community levels include opportunities to engage in prosocial activities and recognition for prosocial involvement, as well as attachment to prosocial others, and healthy beliefs and clear standards for behaviour (Catalano & Hawkins, 1996).

According to the SDM, community and family characteristics such as low socioeconomic status (SES) are social structural influences on external constraints (informal and formal social controls) and on perceived prosocial and antisocial opportunities. Low SES is recognised as important influence on the development of violent behaviour (Toumbourou et al., 2007). The SDM also identifies the role of exogenous variables in the form of constitutional/biological factors in processes of socialization resulting in violence and related behaviours (Hawkins & Weis, 1985; Laundra, Kiger, & Bahr, 2002).

How society responds to problem behaviour (e.g., school suspensions, arrests) is also an important consideration, which can influence the risk of violence among youth (Hemphill, Toumbourou, Herrenkohl, McMorris, & Catalano, 2006). For young people to learn that certain behaviours are not acceptable, the community needs to inform them when their behaviour is inappropriate and provide consequences that discourage them from engaging in such behaviour. Research on the impact of school suspensions has shown several unintended consequences including intensifying academic difficulties (Arcia, 2006), school drop-out (Arcia, 2006), disengagement from school (Butler, Bond, Drew, Krelle, & Seal, 2005), student alienation, crime and delinquency, and alcohol and drug use (American Academy of Pediatrics, 2003; Costenbader & Markson, 1998). Hemphill et al. (2006) showed that school suspensions *increased*, rather than decreased, the likelihood of antisocial behaviour 12 months later above and beyond established risk and protective factors. Further, rates of suspensions were higher in Washington State than in Victoria. The negative impact of arrests on young people's behaviour has also been documented (Bushway, 1998; Huizinga & Esbensen, 1992; Huizinga, Weiher, Espiritu, & Esbensen, 2003).

While theories like the SDM recognise the importance of multiple risk and protective factors across different levels of influence (individual, family, peers, school, and the community), few studies have examined a full range of influences in comparative analyses of violence across countries. We do not know of any other study that has systematically investigated predictors of youth violence in Australia and the U.S..

The current paper

Data for the current paper are drawn from the International Youth Development Study (IYDS), a prospective cross-national study that uses standardised methodologies. The IYDS investigates the development of substance use and related behaviours, including violence, in state-wide representative samples from Victoria, Australia and the U.S. state of Washington State. Students recruited to the study were in Grades 5, 7, and 9 at the time (2002). These two states were chosen due to their similarities on a range of population demographic and financial characteristics (McMorris et al., 2007), as well as for their differences around substance use and problem behaviour policies. With a rigorous design and standardised procedures for participant recruitment, survey development and administration, and data management (McMorris et al., 2007), the study overcomes the common methodological limitations of many previous cross-national comparisons (Pirkis et al., 2003). Here we examine the effects of risk and protective factors from individual, family, peer, school and community domains, and social responses to problem behaviour on violent behaviour 12 months later, after controlling for social structural factors (low income, workless household and sole parent status). Here we focus on risk and protective factors at the school and community levels as well as societal responses to problem behaviour. We also include established factors from the levels of the individual (previous violent behaviour, impulsivity, binge drinking, emotion control), family (family conflict, attachment to mother) and peers (association with violent peers).

The key questions addressed in this paper are:

- **a.** Are the rates of youth violence similar in Victoria and Washington State?
- **b.** What are the modifiable risk and protective factors for youth violence in Victoria and Washington State?
- **c.** Are social responses to problem behaviour predictors of violent behaviour 12 months later after the inclusion of other established risk and protective factors?

Given the overall comparability of the two states, we expect both the rates of youth violence and the factors that influence the development of youth violence to be similar. We also

anticipate that in both states the predictors of youth violence will span the full range of potential influences (individual, family, peer, school and community), as well as indicators of socioeconomic status (households with low income, workless households and sole parents). Based on previous findings in relation to social responses to antisocial behaviour (Hemphill et al., 2006), we anticipate that school suspensions and arrests will predict violent behaviour 12 months later, even when other influences are included.

Method

Participants

A two-stage cluster sampling approach was used for school and student recruitment in 2002. Schools were randomly selected in the first stage and a target classroom within each school was randomly selected in the second stage. Within each state and grade level, public and private schools containing Grades 5, 7, or 9 were randomly selected using a probability proportionate to grade-level size sampling procedure (Kish, 1965). More details about recruitment and participation rates are described in McMorris et al. (2007).

Across the three age cohorts (Grades 5, 7 and 9), classes in Washington State (WA) yielded a total of 3,856 eligible students, of whom 2,885 (74.8%) consented to and participated in the survey. In Victoria (VIC), 3,926 students were eligible for consent and survey administration, of whom 2,884 (73.5%) consented and participated. Parents provided written consent for their adolescent to participate in the study and adolescents provided assent to complete the survey. Retention rates at 12-month follow-up in 2003 were 99% in both states.

Data for the Grade 7 (n_{VIC} = 984; n_{WA} = 961) and Grade 9 (n_{VIC} = 973; n_{WA} = 981) cohorts are reported due to the focus on adolescent violent behaviour, and the similarity of measures and higher rates of violence in these cohorts. In each state, the Grade 7 cohort was comprised almost entirely of 12- and 13-year-olds, and the Grade 9 cohort of 14- and 15-year-olds, and males and females were equally represented. In both states, the rate of students living in low income households (income ≤ $30,000) was 22%. There were state differences in the percentage of students living in sole parent households, 20% in Victoria, and 24% in Washington State ($p < .01$), and in workless households (no parent in employment versus one or both parents working), 9% in Victoria and 19% in Washington State ($p < .001$).

Procedure

Protocols were approved by the University of Washington Human Subjects Review Committee and the Royal Children's Hospital Ethics in Human Research Committee. Permission to conduct research in schools in Washington State was obtained from the school districts containing sampled schools and then from principals. In Victoria, permission was obtained from the Department of Education and Training for government (public) schools and the Catholic Education Office for some private schools, and then from principals.

To control for seasonal effects, surveys in 2002 and 2003 were administered in February to June in Washington State and in May to November in Victoria by study staff (McMorris et al., 2007). Surveys were group-administered in classrooms during a 50-60 minute period. Students absent from school were administered surveys later under the supervision of trained school personnel or in a small percentage of cases (less than 3% at the first assessment, less than 4% at 12 month follow-up), over the telephone by study staff. Upon survey completion at both time-points, students in Washington State received $10. Victorian students received small thank-you gifts (a small pocket calculator upon return of their consent forms in 2002 and a stress ball after completing the survey in 2003).

Measures

The self-reported measures of violent behaviour and the risk and protective factors were drawn from the *Communities that Care* survey which has been found to have acceptable psychometric properties (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Glaser, Van Horn, Arthur, Hawkins, & Catalano, 2005; Pollard, Hawkins, & Arthur, 1999).

Violence—Violence was measured at both time-points by two items that asked how often in the past 12 months students had (1) attacked someone with the idea of seriously hurting them, and (2) beaten up someone so badly that s/he required medical treatment. Response options ranged from *Never* to *40 or more times*, on an 8-point scale. A dichotomous measure was created for violent behaviour at each wave; violent behaviour was present (score of 1) if students reported either behaviour one or more times and absent (score of 0) if students responded never to both questions. A dichotomous measure was appropriate for this study, as the distribution of scores showed that few students had engaged in high levels of this behaviour; the presence versus absence of this behaviour is therefore the focus of this analysis.

Risk and protective factors—Individual, family, peer, school, and community level risk and protective factors measured at the first assessment are summarised in Table 1 (multiple imputed datasets were used, see Statistical analysis section) along with Cronbach's alphas for scale scores which are based on unimputed (or complete case) data. Most risk factor items are rated on a 4-point scale (*definitely not true, mostly not true, mostly true,* and *definitely true*). Exceptions were community norms favourable to drug use (*very wrong* to *not wrong at all*); perceived availability of drugs (*very hard* to *very easy*); and academic grades (*very poor to very good*). Scores on the “interaction with violent peers” item were transformed from a 5-point scale (*none of my friends* to *4 of my friends*) to a 4-point scale and binge drinking was recoded to a binary variable (1 = ever and 0 = never). All protective factors were rated on a 4-point scale and for most scales response options ranged from *definitely yes* to *definitely no*. The exception was family recognition for prosocial involvement (*never* or *almost never* to *all the time*). Example items for each factor are included in Table 1. A complete list of items included in each of the risk and protective factor scales is available in previous publications (Arthur et al., 2002;Glaser et al., 2005;Pollard et al., 1999) or by request from the authors.

Two items measuring ***social responses to problem behaviour*** were included as risk factors in the analyses. Students' reported at the first assessment how many times in the past 12 months they had been suspended from school and arrested, *Never* to *40 or more times* on an 8-point scale. Scores were recoded as present (students had experienced the consequence one or more times in the past year, score of 1) or absent (students had never experienced the consequence, score of 0) to form a dichotomous measure of school suspension and being arrested.

Correlations between risk and protective factors

In both states, intercorrelations between all risk and protective factors were generally moderate and below 0.50. The exceptions in both states were that the school protective factors of opportunities for prosocial involvement and recognition for prosocial involvement were correlated (0.58 in Victoria, 0.51 in Washington State) and the community protective factors of opportunities for prosocial involvement and recognition for prosocial involvement were correlated (0.71 in Victoria, 0.75 in Washington State). Hence, bivariate associations were below 0.90, and thus were not at a level at which multi-collinearity is assumed to influence results (Tabachnick & Fidell, 2001).

Statistical analysis

Honesty of participants

Items included to assess whether students answered the survey questions honestly or not asked how honest the student was when filling out the survey (*all of the time, most of the time, some of the time, once in a while*, or *not honest at all*); or for student reports of ever, or in the past 30 days, using a fake drug; or for student reports of using illicit drugs on more than 120 occasions in the past 20 days. A single measure of honesty (*yes/no*) was calculated using these items. Few students (17 at the first assessment, 35 at 12 month follow-up and 6 at both time points) met the criteria for dishonesty. Results presented here include only students who were “honest”.

A further 23 students (14 from Victoria, 9 from Washington State) with a large number of missing observations (≥10 missing responses for either the outcome or explanatory variables) were further excluded from the analysis. For the resultant sample (in Victoria, 915 males and 990 females; in Washington State, 949 males and 964 females), the rates of missing data were low for the majority of individual variables (no missing values for gender and state, under 4% for all other variables included in the main analysis, except income which was missing for 16% of the students). Although missing data were minimal, we used a multiple imputation procedure to reduce the possibility of biased estimates that can emerge from other approaches to handling missing data, such as listwise deletion and pairwise analysis. Multiple imputation generates numerous data sets. In the many datasets that are created, relationships between variables are maintained and an aspect of statistical uncertainty is incorporated. These datasets are analysed separately, as they would be in a complete case analysis, then the model parameter estimates are combined to produce estimates and confidence intervals that incorporate the missing-data uncertainty. The IVEware statistical software package, available in SAS (Version 9.1, SAS Institute Inc., Cary, NC, USA.), was used to create the multiply imputed datasets and SAS was used to perform the analyses.

Consistent with current standards in the field, 20 datasets were imputed, with males and females from each state imputed separately because the patterns of violent behaviour and influential factors differ according to gender (Moffitt, Caspi, Rutter, & Silva, 2001). The imputation models incorporated the risk and protective factors and outcome variables of interest measured at the two waves of data collection, along with the social structural factors and some additional variables thought to influence these main variables of interests. Additional variables were included to add information to the imputation procedure, thereby reducing possibly biased estimates. Here, we followed the general rule that the more variables informing the imputation, the more accurate estimated data are likely to be. Variables included are student's age and cohort, rural/urban residence, parent's level of education and if they were receiving welfare, other antisocial behaviours at both assessments (carried weapon; stolen something $5/$10+; sold illegal drugs; stolen a vehicle), and other individual, family and community risk and protective factors at first assessment (e.g., rebelliousness, sensation seeking, parental attitudes favourable towards drug use, opportunities for prosocial involvement in the family, perceived availability of drugs in the community, low neighbourhood attachment).

The students in each state were recruited in schools and so cannot be considered to be independent of each other, as students attending the same school are more likely to be more similar to other students attending the same school than students attending a different school. This is because students in the same school are exposed to the same environment at school and are likely to come from similar types of neighbourhood. One approach for dealing with this type of clustered data is generalised estimating equations (GEE). Logistic

GEE regression models were used to examine the prediction of violence at the second assessment, which took into account the clustering of students within schools and in this analysis we assumed equal correlations among observations nested within-school. First, for each state, separate unadjusted logistic regression models tested for associations between each predictor variable at the first assessment and violence at the second assessment, 12 months later. To determine whether to conduct the analyses separately for each state or as a combined sample across states, the interaction between state and each predictor variable was examined in an analysis of the entire sample. Only two significant interaction terms were found (state-by-mother attachment and state-by-community norms favourable to drug use) and when these interaction terms were entered in the full model (described below), neither of them was significant (see Model 1 in Table 4). Based on these results, subsequent analyses were conducted on the entire sample (Victoria and Washington State combined) and a model that included all variables as predictors of violent behaviour at the second assessment without the interaction terms was fitted (see Model 2 in Table 4). All analyses were repeated on unimputed data using listwise deletion (only cases with complete data on all of the variables were included in the analyses). The pattern of findings was very similar to the results obtained using imputed data. Given the recognised advantages of multiple imputation, the results of analyses conducted with imputed data are presented in this paper.

Results

Levels of violent behaviour in Victoria and Washington State

Table 2 presents the rates of violent behaviour in the two states for the total sample and by gender. The differences in the proportions were tested using a normal approximation to the binomial distribution. For the total sample, there were no state differences in violent behaviour. At the first assessment, there were no state differences in the prevalence of violent behaviour for males; however, rates of violent behaviour were significantly higher for Washington State females. At the second assessment, rates of violent behaviour were significantly higher for Victorian males. There were no state differences for females at the second assessment. In each state, the rates of violent behaviour were higher in males than females at each assessment (in Victoria $p < 0.0001$ at each assessment; in Washington State $p < 0.01$ and $p < 0.001$ at the first and second assessments respectively). Table 2 demonstrates evidence toward our first research question regarding whether or not the rates of youth violence in these two states are similar.

Levels of risk and protective factors in the two states

Mean levels of risk and protective factors in each state are presented in Table 1. Bonferroni adjustment was used ($p < .0036$) to correct for multiple comparisons on independent *t*-tests. Victorians scored higher than Washington State students on impulsivity and community norms favourable to drug use. Washington State students reported higher scores than Victorian students on emotion control and opportunities for prosocial involvement in both school and community contexts. These statistically significant differences are small and are due to the large sample size with the largest difference being 0.16 on a four-point Likert scale for community norms favourable towards drug use.

The proportion of the sample who engaged in binge drinking and the percentage of the sample in receipt of a social response in the past year are shown at the bottom of Table 1. The number of Victorian students was more than double the number of Washington State students who reported engaging in binge drinking in the first survey. At the first assessment, more Washington State than Victorian students reported being suspended from school and arrested, although rates of arrests were low (see bottom of Table 1). Due to the large sample size, small differences 1-5% were significant.

Predictors of violent behaviour

The results of unadjusted, bivariate logistic regression analyses for each state are shown in Table 3. Logistic regression coefficients have been transformed to odds ratios for ease of interpretation. These analyses show the risk and protective factors for later violent behaviour, not necessarily for the initiation of violent behaviour (which may have started before measures were taken in this study). For students in both states, all variables, except workless household in Victoria, were significant predictors of violent behaviour at the 12-month follow-up. Not surprisingly, in both states, reports of engaging in violent behaviour at the first assessment significantly increased the likelihood of engaging in subsequent violent behaviour. Social responses at the first assessment increased the odds of violent behaviour more than five times in both states. Other factors that increased the likelihood of violent behaviour at the second assessment were low income household, workless household (for U.S. only), sole parent status, impulsivity, binge drinking, family conflict, association with violent peers, low school grades, low commitment to school, community disorganisation, community norms favourable to drug use, and enforcement favourable to drug use. Protective factors in both states were being female, student emotion control, attachment to mother, opportunities and recognition for prosocial involvement at school, and opportunities for prosocial involvement in the community; unit increases in these scales decreased the likelihood of violent behaviour by up to 2 times, except that being female in Victoria reduced the likelihood almost 3 times. Two significant interactions were found; state-by-mother attachment and state-by-community norms) and these were included in the final model (see Table 4).

Table 4 displays the results for the entire sample (N = 3,818) of including all of the independent variables as predictors, thus highlighting the unique (but not shared) contribution to explanation of variance in violent behaviour. Again, these analyses show risk and protective factors for later violent behaviour (not necessarily initiation of violent behaviour). Model 1 in Table 4 shows the full model with interaction terms. Neither of these interaction terms was significant in Model 1 suggesting that the interaction terms do not explain additional variance above and beyond the other risk and protective factors in the model. Hence the full model without interaction terms (Model 2) is presented and will form the basis of our findings in this paper. State and demographic variables were entered first. The clusters of variables were then entered in order of their proximity to the student, from the individual level to the community level. Social responses were entered last of all. In this model, unique risk factors for violent behaviour at the second assessment in both states were violent behaviour at the first assessment, family conflict, association with violent peers, community disorganisation, community norms favourable to drug use, school suspensions, and arrests. Being female, student emotion control, and recognition in the community for prosocial activities were protective factors. Violent behaviour at the first assessment was the strongest predictor of subsequent violent behaviour, increasing the odds of violent behaviour 12 months later by almost 5.

Discussion

Prevention research has been largely limited to samples in the U.S., with limited investigation to ensure findings apply internationally. We present the first study designed to compare the prevalence and predictors of youth violence in Australia, a comparable Western nation to the U.S.. The main finding of this study is that the modifiable determinants and rates of self-reported violence in the two states are mostly similar. This study also showed that there were relatively small differences between states in the rates of self-reported violence according to gender, with Washington State females engaging in higher rates of violent behaviour than their Victorian counterparts at the first assessment and more Victorian than Washington State males engaging in violent behaviour at the second

assessment. There were also state differences in students' experiences of school suspension and arrests at the first assessment, with males from Washington State relative to Victoria experiencing more arrests and more school suspensions. Further, this study confirmed established risk and protective factors for young people's violent behaviour identified in previous studies.

Consistent with previous international studies, this paper shows similarities in risk and protective factors which are predictive of violent behaviour in the two states. Prior research has also found comparable predictors in studies of countries in Europe, the United Kingdom, the U.S., and Japan, particularly in relation to family factors (see Junger-Tas et al., 2003; Vazsonyi et al., 2007). The current study is unique in its comprehensive measurement of risk and protective factors across five domains (individual student, family, peers, school and community).

The risk factors identified in this study as explaining unique portions of the variance in violent behaviour confirm those found to have strong relationships in previous studies (Catalano & Hawkins, 1996; Hawkins et al., 1998; Hemphill et al., 2006). When looking at the effects of all the factors simultaneously, the strongest predictor in both states was pre-existing violent behaviour at the first assessment. This is consistent with many other studies showing that the best predictor of current behaviour is past behaviour, and the continuity across time of violent behaviour in particular (Ellickson & McGuigan, 2000; Farrington & Loeber, 2000). Being female and student emotion control were protective factors. Family conflict increased the likelihood of students engaging in violent behaviour 12 months later, as did association with violent peers, community disorganisation and community norms favourable to drug use. The experience of school suspensions and arrests at the first assessment yielded an over one and a half-fold increase in the likelihood of violent behaviour 12 months later. There is a growing body of evidence showing the negative consequences of schools suspensions (American Academy of Pediatrics, 2003; Arcia, 2006; Butler et al., 2005; Costenbader & Markson, 1998; Hemphill et al., 2006), and arrests (Bushway, 1998; Huizinga & Esbensen, 1992; Huizinga et al., 2003).

Some state differences were found in the rates of violent behaviour with more Washington State than Victorian females engaging in violent behaviour at the first assessment and more Victorian than Washington State males engaging in violent behaviour at the second assessment. The differences between female students in the two states were no longer apparent at the second assessment. Further longitudinal data are needed to investigate whether the higher rates of violence for Victorian males continue through adolescence.

The findings shed some light on the inter-relationship between influences through early and mid-adolescence. A number of factors showed a reduced effect in the full multivariate analysis (Table 4, Model 2). In both states, a number of peer, family, school and community influences showed reduced or non-significant effects after multi-variate adjustment for other factors, most notably initial levels of violent behaviour. The present findings support the need for violence to be addressed in childhood or earlier in adolescence when violent behavioural pathways are being initially established.

Limitations of the study

Other factors not measured in this study have also been found to be important in the development of violence. Although the school risk and protective factors measured here (with the exception of school suspensions) were individually predictive, they did not uniquely contribute above the effects of the other variables in the multivariate model. This suggests much shared variance with individual violence, school suspensions, arrests and gender. These measures may have missed aspects of school that do not share common

variance such as school climate, and student cognitions which have been shown to be important in the development of violence (Fontaine, Salzer Burks, & Dodge, 2002). Genetic and biological factors such as body size may also have a role; studies that integrate psychosocial and biological factors are crucial (Moffitt, 1993). The situational influences arising through activities such as alcohol and drug use were not examined here but have been shown to influence violent behaviour (Ellickson, Saner, & McGuigan, 1997; Farrington, 1998; White, Loeber, Stouthamer-Loeber, & Farrington 1999).

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 behaviour (or surrounding context) modelled 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 hypothesised 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 SDM, as well as those that could be conceptualized as risk and/or protective factors depending on how they are operationalised and scored.

Given that participants may have already engaged in violent behaviour before the data for this study were collected, the causal ordering of risk and protective factors cannot be determined. Findings from this study relate to risk and protective factors measured prior to the later measurement of violent behaviour (rather than initiation of violent behaviour). A final limitation of this study, given that students in Years 7 and 9 were included, was that age was not included in the analyses. However, analyses were run with and without age included and revealed very similar results. Hence, the more parsimonious models are presented in this paper. Finally, the intercorrelations between community opportunities for and recognition of prosocial involvement were high in both states but within the acceptable range (Tabachnick & Fidell, 2001).

Implications of findings

The results of this study have important implications for practice and policy. The finding that many of the predictors of youth violence are similar in Victoria and Washington State has implications for the implementation in Australia of prevention and early intervention programs developed in North America to address the common risk and protective factors. A range of prevention and early intervention programs for youth violent behaviour have been evaluated in North America (e.g., *Communities that Care*, Olweus Bullying Prevention Program, Seattle Social Development Program, Strengthening Families Program for Children and Youth) and may have applicability in Australia. Given the similarity of predictors of violent behaviour in the current study, where North American programs address common predictors and have been tested and found to be effective in reducing youth violence, they may be appropriate in the Australian context, perhaps with minor modifications to fit with the Australian setting (e.g., cultural nuances) and vice versa. Similar comparisons between other countries and the U.S. will assist in determining the appropriateness of North American programs for other areas of the world.

The results this study can also inform modifiable targets for prevention and early intervention. The finding that earlier-occurring violence was predictive of the same behaviour 12 months later emphasises the importance of intervening early when signs of violence develop. The influence of conflict in the family emphasises the importance of

programs that assist families under stress to manage their conflicts in non-violent ways and to foster in their children non-violent ways of resolving conflicts. Interacting with other young people who engage in violent behaviour was a predictor in this study, underlining the importance of providing young people with supervised activities in which young people with a range of backgrounds participate. Community disorganisation, reflective of a disadvantaged community with crime and drug selling, raised the likelihood that students would engage in violent behaviour. Providing young people with safe, positive environments in which to live is important for their subsequent development. Further, community norms favourable to drug use increase the likelihood of subsequent youth violent behaviour underlining the influence that broader community attitudes have on youth behaviour.

The findings in this study again highlight the negative impact of punitive social responses to problem behaviour on subsequent behaviour. Alternative, potentially effective and less punitive methods of dealing with problem behaviour are available (e.g., restorative justice, withdrawal of privileges, writing a contract with the student regarding behavioural expectations) and could be more widely implemented if their effectiveness is supported.

Importantly, this study also identified two factors that reduce the likelihood of developing violence, including the student's ability to control emotions in difficult situations. These findings suggest clear targets for efforts to foster skills and positive behaviours in adolescents to minimise the likelihood of violence. The results of this study overall support targeting multiple levels of risk and protective factors for effective prevention.

Conclusions

The current methodologically rigorous, international comparison study has shown that the modifiable influences on young people's violent behaviour are similar in Australia and the U.S.. This has crucial implications for the potential effectiveness of evidence-based North American prevention and early intervention programs in the Australian context. Further, the risk and protective factors identified here are consistent with previous studies of the predictors of adolescent violence. An important finding in this study was the negative impact of social responses to problem behaviour (school suspensions and arrests in the context of this paper) on subsequent violent behaviour. The negative consequences of school suspensions and arrests warrant greater discussion and consideration in developing effective approaches in schools and the community for dealing with violent and related behaviours.

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Table 1

Descriptive statistics for student-reported risk and protective factors in Victoria and Washington State at the first assessment (*n* =1,905 Victoria; *n* = 1,913 Washington State)

	Victoria Mean (SD)	Washington Mean (SD)
Individual risk factors		
Impulsivity	1.99 (0.56)*	1.92 (0.57)
(eg, "I rush into things, starting before I know what to do")		
Cronbach alpha .57-.59		
Individual protective factors		
Emotion control	2.64 (0.64)	2.77 (0.66)*
(eg. "I control my temper when people are angry with me")		
Cronbach alpha .72-.75		
Family risk factors		
Family conflict	2.25 (0.78)	2.28 (0.78)
(eg. "People in my family often insult or yell at each other")		
Cronbach alpha .70-.80		
Family protective factors		
Attachment to mother	3.25 (0.68)	3.18 (0.74)
(eg. "Do you share your thoughts and feelings with your mother?")		
Cronbach alpha .85		
Peer risk factor		
Association with violent peers	1.26 (0.66)	1.25 (0.67)
(eg. "In the past 12 months how many of your best friends attacked someone with the idea of seriously hurting them?")		
Cronbach alpha N/A (1 item)		
School risk factors		
School grades	2.00 (0.65)	2.06 (0.73)
(eg. "Putting them all together, what were your grades/marks like last year?")		
Low commitment to school	2.23 (0.61)	2.23 (0.59)
(eg. "How often do you feel that the schoolwork you are assigned is meaningful and important?")		
Cronbach alpha .53-.79		
School protective factors		
Opportunities for prosocial involvement	2.98 (0.48)	3.04 (0.41)*
(eg. "I have lots of chances to be part of class discussions or activities.")		
Recognition for prosocial involvement	2.87 (0.58)	2.82 (0.56)
(eg. "The school lets my parents know when I have done something well")		
Cronbach alpha .52-.71		
Community risk factors		
Community disorganisation	1.48 (0.52)	1.50 (0.58)
(eg. crime and/or drug selling in the neighbourhood)		
Norms favourable to drug use	1.72 (0.69)*	1.56 (0.71)

	Victoria Mean (SD)	Washington Mean (SD)
(eg. "How wrong would most adults (over 21) in your neighbourhood think it is for kids to drink alcohol?")		
Enforcement favourable to drug use	2.60 (0.80)	2.64 (0.84)
(eg. "If a kid drank some alcohol (like beer, wine or liquor/spirits) in your neighbourhood would he or she be caught by the police?")		
Cronbach alpha .76-.85		
Community protective factor		
Opportunities for prosocial involvement	2.61 (0.66)	2.67 (0.69)*
(eg. "There are lots of adults in my neighbourhood I could talk to about something important")		
Recognition for prosocial involvement	2.35 (0.87)	2.38 (0.92)
(eg. "My neighbours notice when I am doing a good job and let me know about it")		
Cronbach alpha .66-.90		
	Victoria %	Washington %
Individual risk factor		
Binge drinking	19.4***	7.9
Social response risk factors		
School suspensions	8.8	11.3**
Arrests	1.8	3.6**

Note. Risk and protective factors are generally scored on a 4-point scale.

* $p < .0036$ (Bonferroni adjustment) state differences using (unadjusted) independent samples *t*-test;

** $p < .01$;

*** $p < .001$

Table 2

Percentage (%) of the sample engaging in violent behaviour at the first assessment and 12-month follow-up (*n* =1,905 Victoria; *n* = 1,913 Washington State)

	TOTAL			MALES			FEMALES		
	VIC	**WA**	***p***	**VIC**	**WA**	***p***	**VIC**	**WA**	***p***
Violent behaviour									
First assessment	8.2	8.1	0.950	12.6	10.0	0.081	4.1	6.3	0.033*
12-month follow-up	12.0	10.1	0.068	17.5	12.6	0.004**	6.9	7.6	0.576

Note. VIC = Victoria; WA = Washington State;

* $p < .05$;

** $p < .01$

Table 3

Results of unadjusted logistic regression analyses predicting violent behaviour at 1-year follow-up from independent variables measured at first assessment (*n* =1,905 Victoria; *n* = 1,913 Washington State)

	Victoria	Washington
	OR (95% CI)	**OR (95% CI)**
Demographic characteristics		
Female	0.37 (0.27 - 0.49)***	0.57 (0.41 – 0.81)**
Low income household	1.49 (1.06 – 2.09)*	1.71 (1.18 – 2.47)**
Workless household	1.53 (0.94 – 2.49)	1.52 (1.05 – 2.21)*
Sole parent	1.83 (1.33 – 2.52)***	1.58 (1.15 – 2.17)**
Individual risk factors		
Violent behaviour	11.27 (8.01 – 15.85) ***	13.03 (8.55 – 19.87) ***
Impulsivity	2.89 (2.27 – 3.67) ***	2.13 (1.69 – 2.70) ***
Binge drinking	2.49 (1.82 – 3.41) ***	3.96 (2.63 – 5.94) ***
Individual protective factors		
Emotion control	0.51 (0.41 – 0.64) ***	0.48 (0.37 – 0.64) ***
Family risk factors		
Family conflict	1.78 (1.53 – 2.09) ***	1.88 (1.56 – 2.26) ***
Family protective factors		
Attachment to mother	0.51 (0.43 – 0.60) ***	0.75 (0.63 – 0.90)**
Peer risk factor		
Association with violent peers	2.10 (1.77 – 2.50) ***	2.16 (1.86 – 2.51) ***
School risk factors		
School grades	2.03 (1.61 – 2.57) ***	1.96 (1.63 – 2.34) ***
Low commitment to school	2.63 (2.08 – 3.34) ***	2.33 (1.83 – 2.97) ***
School protective factors		
Opportunities for prosocial	0.50 (0.37 – 0.69) ***	0.58 (0.39 – 0.86)**
Recognition for prosocial	0.51 (0.41 – 0.65) ***	0.68 (0.53 – 0.88)**
Community risk factors		
Community disorganisation	2.54 (2.00 – 3.23) ***	2.18 (1.72 – 2.77) ***
Norms favourable to drug use	2.16 (1.75 – 2.67) ***	1.62 (1.34 – 1.95) ***
Enforcement favourable to drug use	1.58 (1.30 – 1.93) ***	1.55 (1.26 – 1.90) ***
Community protective factor		
Opportunities for prosocial	0.66 (0.54 – 0.81) ***	0.62 (0.49 – 0.78) ***
Recognition for prosocial	0.85 (0.72 – 1.00)*	0.77 (0.65 – 0.93)**
Social responses		
School suspension	5.51 (3.87 – 7.84) ***	5.01 (3.39 – 7.42) ***
Arrest	5.05 (2.53 – 10.07) ***	7.97 (5.09 – 12.47) ***

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Table 4

Results of multivariate logistic regression analyses predicting violent behaviour at 1-year follow-up from independent variables measured at first assessment (n = 3,818)

	Model 1 Full model with interactions	Model 2 Full model without interactions
	OR (95% CI)	OR (95% CI)
Demographic characteristics		
State	0.47 (0.13 – 1.66)	0.79 (0.62 – 1.02)
Female	0.51 (0.39 – 0.66)***	0.50 (0.39 – 0.65)***
Low income household	1.09 (0.78 – 1.52)	1.08 (0.78 – 1.51)
Workless household	1.27 (0.86 – 1.87)	1.28 (0.87 – 1.89)
Sole parent	1.25 (0.92 – 1.71)	1.23 (0.90 – 1.68)
Individual risk factors		
Violent behaviour	4.86 (3.44 – 6.87)***	4.83 (3.43 – 6.82)***
Impulsivity	1.19 (0.96 – 1.48)	1.21 (0.97 – 1.49)
Binge drinking	1.07 (0.75 – 1.52)	1.09 (0.77 – 1.54)
Individual protective factors		
Emotion control	0.68 (0.55 – 0.85)**	0.68 (0.55 – 0.85)**
Family risk factors		
Family conflict	1.20 (1.01 – 1.43)*	1.20 (1.01 – 1.43)*
Family protective factors		
Attachment to mother	0.80 (0.63 – 1.02)	0.93 (0.78 -1.11)
Peer risk factor		
Association with violent peers	1.20 (1.03 – 1.40)*	1.20 (1.02 – 1.40)*
School risk factors		
School grades	1.10 (0.91 – 1.33)	1.11 (0.91 – 1.34)
Low commitment to school	1.15 (0.89 – 1.47)	1.15 (0.90 – 1.48)
School protective factors		
Opportunities for prosocial	1.18 (0.84 – 1.66)	1.17 (0.83 – 1.66)
Recognition for prosocial	0.97 (0.76 – 1.24)	0.96 (0.75 – 1.24)
Community risk factors		
Community disorganisation	1.30 (1.03 – 1.63)*	1.29 (1.03 – 1.61)*
Norms favourable to drug use	1.44 (1.10 – 1.89)**	1.29 (1.08 – 1.54)**
Enforcement favourable to drug use	1.08 (0.91 – 1.27)	1.08 (0.92 – 1.28)
Community protective factor		
Opportunities for prosocial	0.97 (0.75 – 1.24)	0.97 (0.76 – 1.25)
Recognition for prosocial	1.07 (0.88 – 1.30)	1.07 (0.88 – 1.31)
Social responses		
School suspension	1.66 (1.18 – 2.33)**	1.66 (1.19 - 2.33)**
Arrest	1.80 (1.05 – 3.09)*	1.81 (1.05 – 3.13)*
Interactions		

	Model 1 Full model with interactions	Model 2 Full model without interactions
	OR (95% CI)	OR (95% CI)
State-by-attachment to mother	1.35 (0.98 – 1.86)	----------
State-by-community norms favour to drug use	0.81 (0.57 – 1.14)	----------

* $p < .05$;

** $p < .01$;

*** $p < .001$.