Predictors and responses to the growth in physical violence during adolescence : A comparison of students in Washington State and Victoria, Australia

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Predictors and Responses to the Growth in Physical Violence During Adolescence: A Comparison of Students in Washington State and Victoria, Australia

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Abstract

This study investigates patterns in violence over 3 time points in early to midadolescence in 2 statewide representative samples of youth, one in Washington State, USA, and the other in Victoria, Australia. Comparable data collection methods in both states were used to cross-nationally compare patterns of violence, risk factors, and responses to violence (school suspensions and arrests) in 2 policy contexts. Risk factors include early use of alcohol, binge drinking, involvement with antisocial peers, family conflict, poor family management, sensation seeking, and bully victimization. These are modeled as correlates of initial violence and predictors of change in violence over a 3-year period, from ages 12 – 15, for participating youth. Results suggest that patterns and predictors of violence are mostly similar in the 2 states. Initial levels of violence (age 13) and change over time in violence were associated in both states with more youth school suspensions and more police arrests in Grade 9. Some cross-national differences were also shown. For example, correlations of violence with gender and violence with binge drinking were stronger in Victoria, whereas correlations of violence with early use of alcohol and with antisocial peer involvement were stronger in Washington State. Antisocial peer involvement and family conflict were significant predictors of a gradual increase in violence from Grades 7 – 9 for youth in Victoria only. Implications are discussed with attention to prevention and intervention efforts.

Keywords

adolescents; youth violence; risk factors; family conflict; school suspensions; arrests; Washington State; Victoria; Australia

According to a comprehensive report on violence and health by the World Health Organization (WHO, 2002), nonfatal (e.g., physical fighting) forms of violence are common around the world. Over a third of school-age children have been in a physical fight. Bullying (aggression and victimization of peers) is also very prevalent worldwide, with estimates of bullying behaviors approaching 50% or more of youth in some countries.

Evidence from epidemiological and etiological studies conducted in countries that include the United States, Canada, the United Kingdom, New Zealand, Sweden, and Finland shows that patterns of violence in adolescents vary according to the number and range of risk factors a youth encounters from an early age (Farrington et al., 2006; Smith et al., 1999; WHO, 2002). Risks are associated with biological, psychological, and behavioral characteristics of a child, as well as risk factors in the environment (including family, school, and community) and situational factors, such as alcohol use and youth having access to weapons (WHO, 2002). Youth violence, a costly problem in the United States, has become a leading public health concern worldwide. However, reductions in violence are possible if risk factors are identified and then ameliorated through planned intervention and policy change efforts focused on removing environmental risks and enhancing protective factors (Institute of Medicine [IOM], 2008). Because of the global impact of violence among young people, it is important that researchers look increasingly to cross-national studies as a way to test and compare predictors and outcomes of violence

Unfortunately, there have been few well-designed cross-national studies from which to learn about patterns and predictors of youth violence (Hemphill et al., 2009). Existing studies have mainly been conducted within a single country or region of a country, which limits the degree to which findings can be generalized broadly (WHO, 2002).

Existing research shows that risk factors for violence are likely similar in countries other than the U.S., although levels of risk can vary according to population demographics (Hemphill et al., 2009; Junger-Tas, Marshall, & Ribeaud, 2003; WHO, 2002). For example, research shows that risk taking and attention problems in children generally increase the risk of violence perpetration. Risk factors within the family are also consistent across studies. These include high-level family conflict, poor family management, and norms in the family favorable to the use of violence. Being involved in a gang and associating with delinquent peers can also increase the risk of an adolescent's perpetrating violence, according to various studies. Environmental risk factors beyond the peer group include neighborhood disadvantage and drug selling in close proximity to a youth's home (Herrenkohl et al., 2000; Herrenkohl et al., 2007; IOM, 2008; Lipsey & Derzon, 1998; WHO, 2002).

Comparison of Risk Factors

Knowledge about these risk factors is important. However, to more fully establish the degree to which predictors are indeed the same regardless of the country in which they are measured, additional international comparisons are needed. Data for the current study are from the International Youth Development Study (IYDS). The IYDS used matched procedures for recruitment and follow-up of participants, data collection, and data management in two representative samples of students to test and compare predictors of youth substance use and antisocial behavior (Hemphill et al., 2007; McMorris, Hemphill, Patton, Toumbourou, & Catalano, 2007). Using matched procedures and comparable sampling techniques provides a strong basis of comparison for research findings and limits errors in measurement that can come about when different methods are used (Pirkis, Irwin, Brindis, Patton, & Sawyer, 2003). Results of earlier IYDS analyses on youth violence suggest similar risk factor profiles in the two countries (Hemphill et al., 2009). However, earlier analyses of the dataset focused on predictors and violence measured at discrete time

points.[1] The current study examines patterns (change) of youth violence perpetration over a 3-year period, during early to midadolescence, and tests the effects of several risk factors analyzed longitudinally. Additionally, the current study includes responses to violence in the same analysis, namely self-reported suspensions from school and police arrests (Hemphill, Herrenkohl, Toumbourou, Catalano, & McMorris, 2009). These are included to test whether the consequences of perpetrating violence differ across policy contexts (Hemphill, Herrenkohl, Toumbourou, Catalano, & McMorris, 2009). Prior research suggests that suspensions appear more readily used under zero-tolerance policies of the United States, which differ from the harm-reduction policies and less exclusionary responses of Australian schools (Hemphill, Herrenkohl, Toumbourou, Catalano, & McMorris, 2009; Skiba & Rausch, 2006a). While violence and other forms of antisocial behavior are of concern to policymakers and school administrators of both U.S. and Australian schools, in Australian schools, an explicit goal is to keep disciplinary procedures from interfering with students' educational opportunities (Hemphill, Herrenkohl, Toumbourou, Catalano, & McMorris, 2009). Interestingly, research on the impact of school suspensions has shown several unintended consequences for students, such as lowering academic achievement and promoting school dropout, which predict further conduct problems, delinquency, and crime (Skiba & Rausch, 2006a). In relevant analyses from the IYDS, Hemphill and colleagues (2006) showed that, after accounting for various covariates, school suspensions had the effect of increasing the likelihood of antisocial behavior 12 months later.

While the policy contexts of the United States and Australia are quite different, the states of Washington and Victoria are themselves very similar. For example, Washington and Victoria are both considered progressive states in their respective countries. Both have higher than national levels of educational participation and are relatively prosperous. Additionally, the two states have similar population sizes, and the demographics of the school-age youth populations are quite similar. Further details of the rationale for the larger IYDS study can be found in earlier publications (Hemphill et al., 2009; McMorris, Hemphill, Patton, Toumbourou, & Catalano, 2007). In sum, the two-sample arrangement for this study allows for an important international comparison of predictors, patterns, and outcomes of youth violence within two countries that have different policies and approaches to handling antisocial behavior (including violence) among youth.

Risk factors examined in this study span the individual, family, and peer domains primarily. They include known predictors of violence: early onset and problem use of alcohol, family conflict and poor family management, involvement with antisocial peers, and individuals' dispositions to violence in the form of low self-control or sensation seeking. Evidence suggests that these variables are salient predictors of violence in youth (Herrenkohl et al., 2000; Loeber & Stouthamer-Loeber, 1998), although few studies have examined these risk factors using matched samples from two different countries. In a study by Herrenkohl and colleagues (2000) of youth in Seattle, family conflict and poor family management, measured at ages 14 and 16, predicted violence in youth at age 18. Peer delinquency and risk taking (similar to sensation seeking in this study) also were predictive of youth violence when measured 2, 4, and even 8 years (for peer delinquency) earlier. Other studies and reviews of research have found these variables to be important explanatory variables in longitudinal studies (Hemphill et al., 2009; Herrenkohl, Chung, & Catalano, 2004; Lipsey & Derzon, 1998; WHO, 2002).

In addition to the above risk factors, analyses include a variable for bullying victimization (whether or not a youth has been bullied). This variable is used to test the hypothesis that

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[1]A prior study by Herrenkohl and colleagues (2009) examined violence in youth at several time points, although the emphasis was on mental health and behavioral outcomes of violence perpetration not including variables studied here.

bullying leads some victims to perpetrate physical violence (Crick, Ostrov, & Werner, 2006; Herrenkohl, Catalano, Hemphill, & Toumbourou, 2009; Leary, Kowalski, Smith, & Phillips, 2003). On this topic, Leary and colleagues (2003) conducted a series of case studies involving youth who perpetrated school shootings in the United States. They found that, in the majority of cases examined (13 of 15), acute or chronic peer rejection (including bullying and ostracism) were experienced by those who later perpetrated serious violence.

In sum, based on the extant literature and results from prior IYDS cross-sectional analyses, we anticipate similarities across settings in the associations among risk factors and indicators of violence in early adolescence. However, given policy differences related to use of exclusionary response, results may show that school suspensions and arrests differ in the two state samples.

Method

Data for this report are from the International Youth Development Study (IYDS), a prospective cross-national study that uses standardized methodologies. The IYDS investigated the development of substance use and related behaviors, including violence, in statewide representative samples from Victoria, Australia and Washington State, United States. Recruited students were in Grades 5, 7, and 9 at the outset of the study in 2002. With a rigorous design and standardized procedures for sampling, participant recruitment and follow-up, survey development and administration, and data management (McMorris, Hemphill, Patton, Toumbourou, & Catalano, 2007), the study overcomes common methodological limitations of many earlier cross-national comparisons (Pirkis, Irwin, Brindis, Patton, & Sawyer, 2003). The adolescent IYDS measures and study design were subjected to several processes to ensure cross-national validity, including cognitive pretesting of the same data collection instrument, pilot testing of the instrument, and matching of sampling, recruitment, follow-up, and survey administration procedures. Standardization ensures that method differences in the IYDS are minimized and that results shown in analyses are indeed linked to differences in the samples being compared.

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 probability-proportionate-to-grade-level-size sampling procedures (Kish, 1965). Parents provided written consent for their adolescents to participate in the study and adolescents provided assent to complete the survey. More details about recruitment and participation for the larger study are described in McMorris et al. (2007).

Data for the Grade 7 cohort ($n_{VIC} = 984$; $n_{WA} = 961$) are the focus of the current investigation. Due to funding considerations, only the Grade 7 cohort of students was followed prospectively in both states for three consecutive waves. This cohort was composed almost entirely of 12- and 13-year-olds at the start of the study in 2002 (Victoria $M = 12.9$, $SD = 0.4$; Washington $M = 13.1$, $SD = 0.4$). Males and females were equally represented. Approximately 65% of students in Washington State described themselves as White, 16% as Hispanic, 6% as Asian/Pacific Islander, 6% as Native American, 4% as African American, and 3% reported belonging to other ethnic groups. In Victoria, the majority of students described themselves as Australian (91%), 6% as Asian/Pacific Islander, 1% as Aboriginal or Torres Strait Islander, less than 1% each as African or Spanish, and 1% reported belonging to other ethnic groups. Annual student survey completion rates during 3 years of the longitudinal study were consistently high for the

cohort in both states, with over 97% of youth completing surveys at the 12- and 24-month follow-ups. An attrition analysis showed that the few students who did not participate in the third wave of data collection were more likely to be from Victoria ($p < 0.01$), slightly older ($p < 0.02$), and from slightly lower income levels ($p < 0.04$) than students who completed the third survey.

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, annual surveys in 2002 – 2004 were administered by study staff in February to June in Washington State and in May to November in Victoria. Surveys were group administered in classrooms during a 50- to 60-min 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%), over the telephone by study staff. Upon completion of each survey, students in Washington State received $10. Victorian students received small thank you gifts (e.g., a small pocket calculator upon return of their consent forms in 2002).

Measures

Measures were developed from the IYDS student survey, a self-report instrument based on the Communities that Care (CTC) Youth Survey, which has shown good reliability and cross-sectional validity in large samples of U.S. students in Grades 6 – 12 (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Glaser, Van Horn, Arthur, Hawkins, & Catalano, 2005; Pollard, Hawkins, & Arthur, 1999). The IYDS survey assesses a broad array of behaviors, as well as risk and protective factors related to substance use and violence. Measures used in the current study include *physical violence* at Grades 7, 8, and 9 for participating youth. At each grade, the same three items were included in the survey: past year reports of having "attacked someone with the idea of seriously hurting them," "beat up someone so badly that they needed to see a doctor or nurse," and having "threatened someone with a weapon." For each wave of the study, a composite (variety) measure of violence was developed (i.e., a count of scores for these three items). Similar measures were used in earlier analyses of the IYDS data (Hemphill et al., 2009; Herrenkohl, Catalano, Hemphill, & Toumbourou, 2009; Herrenkohl et al., 2007).

The composite measures of violence for youth at each grade were moderately correlated ($\underline{r}$ = .34 – .43 for youth in Victoria and $\underline{r}$ = .26 – .40 for youth in Washington). Overall, 8.6% of youth perpetrated some violence in the past year according to one or more indicators in Grade 7 (106 males, 12.1% of all males and 52 females, 5.5% of all females). In Grade 8, 11.9% of youth perpetrated violence (137 males, 15.5% of all males and 81 females, 8.5% of all females). In Grade 9, 12.2% of youth perpetrated violence (143 males, 16.2% of all males and 81 females, 8.6% of all females).

Predictors of violence include early use of alcohol (Grade 7), which is measured by a single item: "How old were you when you first had more than just a sip or two of an alcoholic beverage (like beer, wine, or liquor/spirits)?" To reflect early use of alcohol, age of first use was recoded to reflect onset by age 13, coded 1 (no onset coded 0). By age 13, 575 (64.3%) of youth in Victoria and 385 (42.0%) of youth in Washington had initiated alcohol use.

Binge drinking (Grade 7) is based on one item: "Think back over the last 2 weeks. How many times have you had five or more drinks in a row?" Responses categories were 1 (*none*), 2 (*once*), 3 (*twice*), 4 (*3 – 5 times*), 5 (*6 – 9 times*), 6 (*10 or more times*). Means and standard deviations were 1.19 and .64 for youth in Victoria and 1.06 and .32 for youth in Washington.

Involvement with antisocial peers (Grade 7) averages eight items for the number of youths' best friends who, in the past year, had been suspended from school, carried a weapon, stolen something worth more than $5 (Aus $10 to be equivalent to US $5), sold illegal drugs, stolen or tried to steal a motor vehicle such as a car or motorcycle, been arrested, dropped out of school, and attacked someone with the idea of seriously hurting them. Responses were 0 (*none of my friends*), 1 (*1 of my friends*), 2 (*2 of my friends*), 3 (*3 of my friends*), 4 (*4 of my friends*). Means and standard deviations were .19 and .34 for youth in Victoria and .28 and .48 for youth in Washington ($\alpha = .67_{VIC}, .81_{WA}$).

Family conflict (Grade 7) is the average of three items: "We argue about the same things in my family over and over," "People in my family have serious arguments," and "People in my family often insult or yell at each other." Responses were 1 (*NO!*), 2 (*no*), 3 (*yes*), 4 (*YES!*). Means and standard deviations were 2.14 and .79 for youth in Victoria and 2.19 and .82 for youth in Washington ($\alpha = .81_{VIC}, .80_{WA}$).

Poor family management (Grade 7) is the average of nine items: "My parents ask if I've gotten my homework done," "Would your parents know if you did not come home on time?"; "The rules in my family are clear"; "When I am not at home, one of my parents knows where I am and who I am with"; "My parents want me to call if I am going to be late getting home"; "My family has clear rules about alcohol and drug use; If you drank some alcohol (like beer, wine or liquor/spirits) without your parents' permission, would you be caught by your parents?"; "If you carried a weapon without your parents' permission, would you be caught by your parents?"; "If you skipped school without your parents' permission, would you be caught by your parents?" Responses were 1 (*NO!*), 2 (*no*), 3 (*yes*), 4 (*YES!*). Means and standard deviations were 1.62 and .48 for youth in Victoria and 1.55 and .51 for youth in Washington ($\alpha = .77_{VIC}, .81_{WA}$).

Sensation seeking (Grade 7) averaged three items: (a) the number of times a youth has done crazy things even if they are a little dangerous; (b) number of times done something dangerous because someone dared you to do it; and (c) number of times done what feels good no matter what. Responses were 1 (*never*), 2 (*I've done it, but not in the past year*), 3 (*less than once a month*), 4 (*about once a month*), 5 (*2 or 3 times a month*), 6 (*once a week or more*). Means and standard deviations were 2.09 and 1.12 for youth in Victoria and 2.15, and 1.19 for youth in Washington ($\alpha = .70_{VIC}, .67_{WA}$).

Bully victimization (Grade 7) was measured with one item: "Have you been bullied recently (teased or called names, had rumors spread about you, been deliberately left out of things, threatened physically or actually hurt)?" Responses were 1 (*no*), 2 (*yes, less than once a week*), 3 (*yes, about once a week*), 4 (*yes, most days*). Means and standard deviations were 1.71 and .99 for youth in Victoria and 1.71 and .96 for youth in Washington.

Responses to violence included school suspensions (Grade 9) and police arrests. School suspensions were based on self-reports of the number of times in the past year a youth was suspended from school. In Victoria, 110 (12.2%) youth had been suspended at least once in the past year. In Washington, 118 (12.8%) youth had been suspended.

Police arrests (Grade 9) were based on self-reports of the number of times in the past year a youth was arrested. In Victoria, 24 (2.7%) had been arrested at least once in the past year. In Washington, 46 (5.0%) youth had been arrested.

Analysis

The study uses latent growth curve modeling (LGM; McArdle & Epstein, 1987; Willett & Sayer, 1994) to examine longitudinal changes in youth violence related to the hypothesized predictors and outcomes described above. LGM is a type of structural equation modeling that uses repeated measures of a behavior like violence as indicators of one or more latent variables that represent individual differences in development over time. Adolescents vary both in terms of their rate and shape of growth in violence. Thus, LGM is useful because it incorporates information from the growth trajectory of each person in a sample that, in turn, can be used to characterize aggregate patterns of change in the outcome variable across time. LGM is often conducted in two stages. First, repeated measures are used to fit a regression curve for each subject, providing a summary of each individual's growth trajectory. Second, variation in the growth trajectories described in the first stage can be predicted by new variables added to the model or can be used to predict additional outcome variables.

Scaling and descriptive analyses were conducted in SPSS (version 12.0). LGM analyses were conducted) in Mplus 5.1 (Muthén & Muthén, 2007). Parameter estimates were derived using the weighted least squares means-variance (WLSMV) estimator, which also incorporates missing data procedures to maximize the use of available data. Model fit was evaluated using the Tucker-Lewis Index (TLI) and the Root Mean Square Error of Approximation (RMSEA), with TLI values close to .95 and RMSEA values between .05 and .08 representing reasonable fit (Browne & Cudeck, 1993; Hu, Bentler, & Kano, 1992).

Violence over three time points was modeled as a latent intercept factor representing initial level, and a latent slope factor representing linear change over time. To account for the contemporaneous measurement of the intercept in violence and other Grade 7 predictors, the intercept factor was correlated with these other variables, namely early use of alcohol, family conflict, poor family management, involvement with antisocial peers, sensation seeking, and bully victimization. Gender was also included in the model as a covariate or predictor of violence growth and outcomes. All Grade 7 predictors were modeled simultaneously, each as a separate measured variable, although shown in Figure 1 as a single predictor set. In so doing, we drew on a key strength of structural equation modeling and sought to examine the independent (adjusted) contribution of each predictor in the model. The latent slope factor of violence was modeled as a mediator variable through which predictors at Grade 7 were hypothesized to influence suspension and arrests at Grade 9. In the analysis, direct effects of the Grade 7 predictors on the Grade 9 outcomes also were estimated.

To compare the coefficients of the model for the two state samples, we conducted a series of multiple-group structural equation models (MGSEMs), starting with a fully unconstrained test of the conceptual model shown in Figure 1. MGSEMs provide a way to systematically test group differences in parameter estimates and adjust the structural relationships among predictors and outcomes for possible effects of other variables within the model. Initially, the coefficients (correlations and path coefficients) of the model for each state—Victoria and Washington—were allowed to vary freely. In subsequent steps, constraints were added to the model and model fit was compared using the chi-square difference test to test for similarities (invariance) in the two samples. To test for overall invariance in the model, a fully constrained model (where all correlations and paths of the model were constrained equal across the groups) was examined first. To systematically examine precisely where group differences in model parameter estimates exist, subsequent models focused on

particular blocks of variables for which constraints were added and compared to the fully unconstrained model. This provided a test of partial invariance for those areas within the model. When a significant change in model fit was observed for a block of variables, each correlation or path of that block was then tested separately to determine if the one coefficient, held equal, significantly changed the overall fit of the model compared to the fit of the unconstrained model. The sequence of model tests consisted of the following blocks: (a) covariances of the latent intercept factor and all other Grade 7 predictors; (b) all paths from Grade 7 predictors to the latent slope factor (including the intercept); (c) all paths from Grade 7 predictors to Grade 9 suspensions outcome; and (d) all paths from Grade 7 predictors to Grade 9 arrests outcome. The paths from the intercept factor and slope to Grade 9 suspensions and from the intercept and slope factors to Grade 9 arrests also were examined separately.

Results

Results of descriptive analyses showed a small but positive increase in violence over the three time points for youth in both state samples (from .11 to .19 in Victoria and from .12 to .17 in Washington—on a scale of 0 – 3). While the increase is small, examination of the data (in Mplus) showed sufficient variability in scores within each sample to examine change over time in violence. Tests of the variance in violence (intercept and slope) controlled for gender.

A test of the full, unconstrained model showed a strong fit to the data: χ^2 (16, $n^{VIC} = 910$ and $n^{WA} = 923$) = 41.37, $p < .0001$; TLI = .973; RMSEA = .042. Compared to the unconstrained model, the fully constrained model χ^2 (35) = 214.66, $p < .0001$, TLI = .91, RMSEA = .075) fit less well. Difference testing in Mplus comparing the two models showed a significant change in model fit for the unconstrained and constrained models, $\Delta\chi$ (23) = 177.63, p<.001.[2]

Results showed that constraining coefficients of Block 1 resulted in a significantly worse fitting model χ^2 (20) = 178.36, $p < .0001$, TLI = .87, RMSEA = .09 compared to the unconstrained model, $\Delta\chi$ (6) = 118.68, $p < .0001$. Similarly, constraining the coefficients of Block 2 worsened the fit of the model significantly, $\Delta\chi$ (7) = 36.99, $p < .0001$, although the model still fit the data adequately, χ^2 (20) = 66.95, $p < .0001$, TLI = .96, RMSEA = .05. Constraining coefficients of Blocks 3 and 4 (paths from the intercept factor and slope factor to Grade 9 suspensions and from the intercept and slope factors to Grade 9 arrests) did not significantly change the overall fit of the model (χ^2 fit statistics for Blocks 3 and 4 are shown in Tables 3 and 4). Thus, comparisons of paths within blocks focused only on those for Blocks 1 and 2 where difference tests were significant.

Table 1 shows the covariances and correlations of the Grade 7 predictors and violence intercept for the two groups from the unconstrained model tested in Block 1. Family conflict, poor family management, and sensation seeking were all moderately positively correlated with violence in both states. Bullying victimization was modestly positively correlated in both states. These correlations were not different across states. However, tests revealed state differences in gender, early use of alcohol, binge drinking, and involvement with antisocial peers (bolded rows of Table 1). As shown, female gender is more negatively correlated with Grade 7 violence in Victoria ($r = -.20$) compared to Washington ($r = -.05$). Early use of alcohol is more positively correlated with Grade 7 violence in Washington ($r = .$

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[2]Both model chi-square values and degrees of freedom for model fit chi-square statistics are mean and variance adjusted when using the WLSMV estimator. Therefore, the degrees of freedom used for significance testing do not correspond directly with the numbers of measured variables and estimated parameters.

32) than in Victoria ($r = .15$), although binge drinking is more positively correlated with violence in Victoria ($r = .39$ for Victoria compared to $r = .35$ for Washington). Additionally, involvement with antisocial peers is more positively associated with violence perpetration in Washington ($r = .67$) compared to Victoria ($r = .55$).

Table 2 shows results of the model testing for Grade 7 predictors of violence slope (correlations of Grade 7 variables referenced above are not shown but were estimated in all subsequent analyses). In the table, unstandardized parameter estimates from the unconstrained model for each state sample are shown, with standardized estimates in parentheses. Results indicate that the intercept of violence is negatively related to the growth in violence over the three time points, but significant only for Victoria, −.30(−.51). Female gender is negatively associated with the slope in violence in both states, −.05(−.12); −.05(−. 15). Involvement with antisocial peers (Grade 7) predicted the slope in violence for youth in Victoria, .11(.19) but not for youth in Washington. In Victoria, family conflict in Grade 7 also predicted an increase in violence, .04(.14), but not in Washington, although the test for state differences of coefficients in this case was not significant. While results show that bullying victimization differs across the two states, coefficients for this predictor within the two states are themselves small and nonsignificant.

Table 3 shows coefficients for predictors of Grade 9 suspensions (Block 3). Group differences in the individual paths of this block were not tested because the block as a whole did not differ between the two states. The following variables predicted Grade 9 suspensions in both states, as shown in the unconstrained model: violence intercept, .79(.26); .81(.25), violence slope, 1.52(.30); 2.06(.33), and Grade 7 involvement with antisocial peers, .46(. 15); .36(.17). Early use of alcohol by age 13 significantly predicted Grade 9 suspensions in Victoria, .32(.15), and poor family management in Grade 7 predicted Grade 9 suspensions in Washington, .34(.17).

Table 4 shows coefficients for predictors of Grade 9 arrests (Block 4). For this block of predictors, both the violence intercept and slope factors predicted Grade 9 arrests in Victoria and Washington. Additionally, binge drinking predicted arrests in Victoria, .16(.10), while sensation seeking predicted arrests in Washington, .09(.11).

Discussion

While there are a few differences in the predictor-to-slope paths of the tested models for youth in Victoria and Washington, the results overall appear more similar than different in this carefully matched two-state comparison. Results show modest to strong correlations between Grade 7 risk factors and levels of violence at age 13 (intercept). In both states, early use of alcohol, binge drinking, involvement with antisocial peers, family conflict, sensation seeking, bullying victimization, and poor family management all were correlated with violence in Grade 7. Differences, when significant, were not because of change in direction or significance, rather because of the strength of relationship. Tests of paths linking earlier to later variables in the model revealed some similarities, including relationships between Grade 7 violence and gender and between gender and the slope of violence from Grades 7 – 9. There were some differences between the two states. For example, involvement with antisocial peers and family conflict predicted an increase in violence from Grade 7 to Grade 9 only in Victoria. These findings, although requiring replication, may point to important differences between the states and countries with respect to factors that promote violence during midadolescence, after accounting for prior violence.

In neither state was early use of alcohol, binge drinking, sensation seeking, or bullying victimization in early adolescence predictive of a change in violence over the 3-year period.

Thus, in this study, these variables appear to have a stronger contemporaneous association with violence than they do with change in violence over time. Thus, prevention programs targeting these risk factors may have their strongest direct effects on violence early in adolescence which, in turn, may lower the risk of growth in violence during adolescence when studies show a peak in the prevalence of youth violence perpetration (Hawkins et al., 1998; Herrenkohl et al., 2000).

The fact that relatively few risk factors predicted an increase in violence over the 3 years suggests the need for investigation into other risk (and protective) factor variables. For example, analyses might examine risks in the school and community contexts, including academic performance, drug selling, and gang involvement (Herrenkohl et al., 2000; Lipsey & Derzon, 1998). It might also be that the relatively small increase in violence over the three time points is not sufficient to identify many predictors. Since violence is a rare event, analyses could be enhanced by examining additional, less to more serious forms of aggression and by studying these behaviors over an extended period. Studying violence using very large samples may also help to detect small predictive influences that are less readily observed in studies with fewer participants, and thus, lower statistical power. (Loeber & Stouthamer-Loeber, 1998; Tremblay et al., 2004).

Initial levels and change in violence over the 3-year period appeared linked to suspensions and arrests for all youth in the study, regardless of state or country and the cultural and policy differences that characterize these two contexts (Hemphill et al., 2007). Thus, irrespective of the apparent stricter and more punitive policies of cities and schools in the United States, youth violence in both countries appears to be met with equally strong responses. However, given that school suspensions have been shown to increase antisocial behavior and cause further offending among violent youth, alternative responses, such as restorative conferences and in-school suspensions, have been suggested (Hemphill et al., 2007; Skiba & Rausch, 2006a, 2006b). The goal of these approaches is to discipline and hold offending youth accountable, while also keeping them connected to school to avoid their sinking deeper into delinquency (Hemphill, Herrenkohl, Toumbourou, Catalano, & McMorris, 2009). In sum, findings of this research show that patterns of violence among youth in both policy contexts of the United States and Australia are linked to a mostly common set of risk factors, and that responses to violence in the two countries are also similar. The goal of prevention is to act on those factors most predictive of the negative behavior in question. By understanding which variables are most strongly correlated with violence, the targets of preventive interventions become clearer (Herrenkohl, Chung, & Catalano, 2004). Prior to assuming that programs tested within the United States to address violence are applicable to other countries, including Australia, it is important to establish precisely the similarities and dissimilarities in the etiology of youth problem behaviors, so that the targets of programs tested in one context may be examined for applicability in another.

This study has several limitations, including a reliance on self-report data, a limited number of time points to estimate a linear change in violence, and use of multiple analyses to test each predictor separately—which could increase the Type I error rate. However, few studies have compared risk factors for youth violence in samples drawn from different countries using comparable data collection methods. The IYDS measures and study design were matched to ensure cross-national validity. This standardization ensures that method differences are most likely not affecting results to the same degree they do in other comparisons.

Analyses of this study offer an opportunity to compare cross-nationally at least some of the variables shown in single-country studies to predict violence. Additional international

studies using carefully standardized methodologies are needed to further examine the extent to which findings from studies conducted in the United States generalize to countries like Australia (Hemphill et al., 2009).

Acknowledgments

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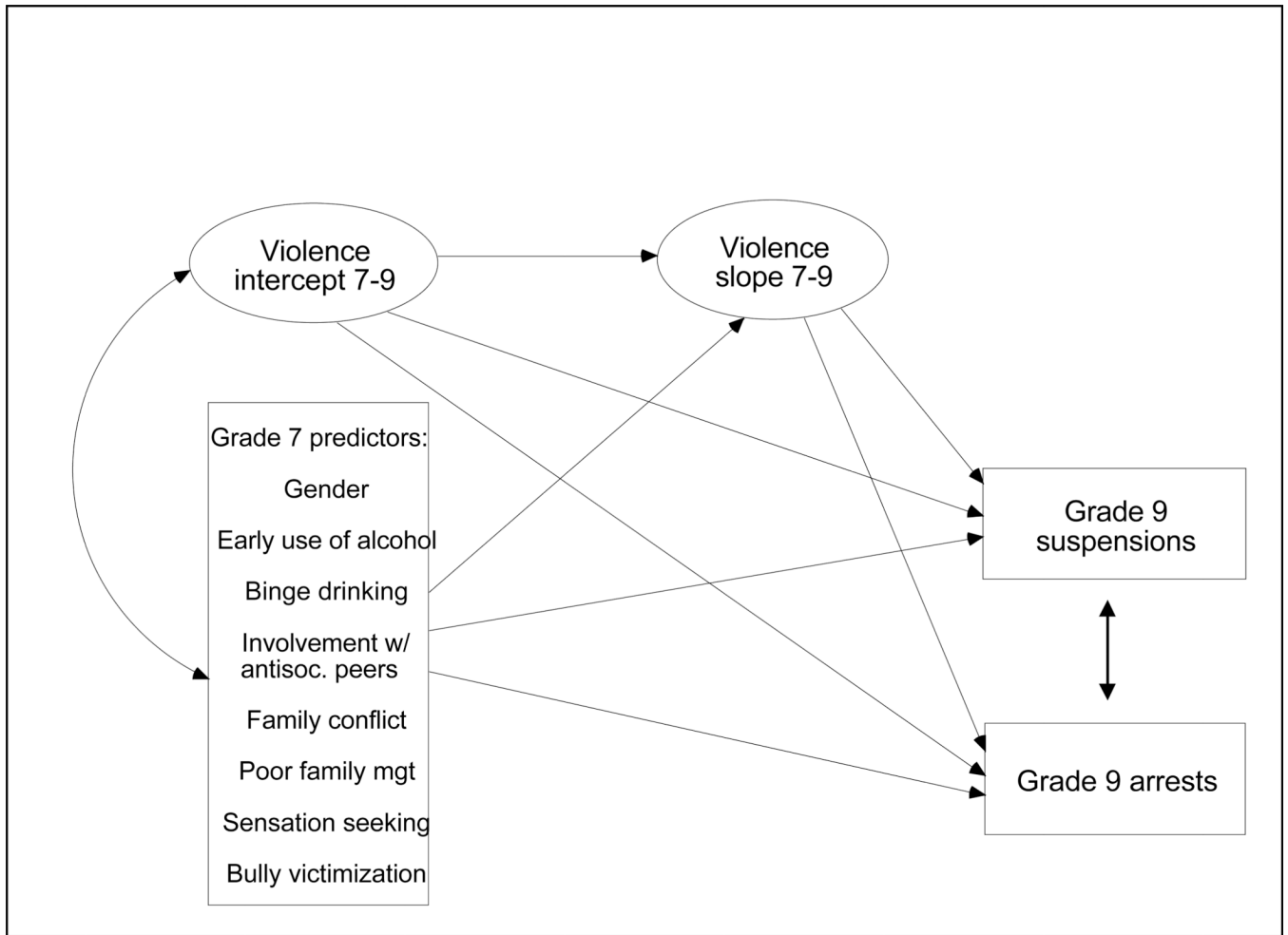
Figure 1.
Conceptual model. Predictors are examined simultaneously as individual measured variables, but are depicted as a set in figure for conceptual clarity.

Table 1

Correlations of Predictors at Age 13 (Grade 7) and Violence Intercept

Chi-square test of group differences for Block 1: $\chi^2(6) = 118.68, p < .001$	VIC Covariance (correlation)	WA Covariance (correlation)	$\Delta\chi$ from unconstrained model
Association between violence intercept and:			
Gender (female)	−.03 (−.20)***	−.01 (−.05)	$\Delta\chi(1) = 6.64$**
Early use of alcohol	.02 (.15)***	.05 (.32)***	$\Delta\chi(1) = 5.99$*
Binge drinking	.08 (.39)***	.03 (.35)***	$\Delta\chi(1) = 95.49$***
Involvement with antisocial peers	.06 (.55)***	.10 (.67)***	$\Delta\chi(1) = 46.54$***
Family conflict	.07 (.24)***	.07 (.28)***	$\Delta\chi(1) = 0.20$
Poor family management	.05 (.28)***	.05 (.28)***	$\Delta\chi(1) = 0.002$
Sensation seeking	.13 (.35)***	.16 (.43)***	$\Delta\chi(1) = 2.03$
Bullying victimization	.03 (.10)**	.06 (.18)***	$\Delta\chi(1) = 1.74$

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.

Table 2

Predictors of Growth in Violence Grades 7 – 9

Chi-square test of group differences for Block 2: $\Delta\chi(7) = 36.98$, $p < .001$	VIC Unstandardized (standardized)	WA Unstandardized (standardized)	$\Delta\chi$ from uconstrained model
Violence intercept to violence slope	−.30 (−.51) ***	−.14 (−.27)	$\Delta\chi(1) = 3.07$
Gender to violence slope	−.05 (−.12) *	−.05 (−.15)**	$\Delta\chi(1) = 0.002$
Early use of alcohol to violence slope	−.01 (−.02)	.02 (.05)	$\Delta\chi(1) = 0.54$
Binge drinking to violence slope	.003 (.01)	−.04 (−.07)	$\Delta\chi(1) = 2.33$
Involvement with antisocial peers to violence slope	**.11 (.19)*****	**−.06 (−.16)**	**$\Delta\chi(1) = 14.56$*****</
Family conflict to violence slope	.04 (.14)**	.02 (.09)	$\Delta\chi(1) = 1.10$
Poor family management to violence slope	.04 (.09)	.01 (.04)	$\Delta\chi(1) = 0.92$
Sensation seeking to violence slope	.01 (.05)	.004 (.03)	$\Delta\chi(1) = 0.16$
Bullying victimization to violence slope	**.01 (.05)**	**−.02 (−.10)**	**$\Delta\chi(1) = 4.62$***

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.

Table 3

Predictors of Grade 9 School Suspensions

Chi-square test of group differences for Block 3: $\Delta\chi(7) = 4.11, p > .05$ [a]	VIC Unstandardized (standardized)	WA Unstandardized (standardized)
Violence intercept to Grade 9 suspensions	0.79 (.26)***	0.81 (.25)**
Violence slope to Grade 9 suspensions	1.52 (.30)***	2.06 (.33)***
Early use of alcohol to Grade 9 suspensions	0.32 (.15)**	0.01 (.003)
Binge drinking to Grade 9 suspensions	0.05 (.03)	0.17 (.05)
Involvement with antisocial peers to Grade 9 suspensions	0.46 (.15)**	0.36 (.17)***
Family conflict to Grade 9 suspensions	0.03 (.02)	0.03 (.03)
Poor family management to Grade 9 suspensions	0.14 (.07)	0.34 (.17)**
Sensation seeking to Grade 9 suspensions	−0.01 (−.01)	−0.01 (−.01)
Bullying victimization to Grade 9 suspensions	−0.001 (−.001)	0.004 (.004)

[a]*Note.* Coefficients for individual paths of the block were not tested because the overall block was nonsignificant for group invariance.

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.

Table 4

Predictors of Grade 9 Arrests

Chi-square test of group differences for Block 4: $\Delta\chi(7) = 5.83, p > .05$ [a]	VIC Unstandardized (standardized)	WA Unstandardized (standardized)
Violence intercept to Grade 9 arrests	0.54 (.18)[*]	0.99 (.31)[**]
Violence slope to Grade 9 arrests	1.41 (.28)[***]	2.31 (.37)[***]
Early use of alcohol to Grade 9 arrests	0.06 (.03)	−0.08 (−.04)
Binge drinking to Grade 9 arrests	0.16 (.10)[*]	−0.04 (.01)
Involvement with antisocial peers to Grade 9 arrests	0.24 (.08)	0.05 (.02)
Family conflict to Grade 9 arrests	0.19 (.15)	0.08 (.07)
Poor family management to Grade 9 arrests	0.10 (.05)	0.24 (.13)
Sensation seeking to Grade 9 arrests	0.04 (.05)	0.09 (.11)[*]
Bullying victimization to Grade 9 arrests	−0.12 (−.12)	0.03 (.03)

[a] *Note.* Coefficients for individual paths of the block were not tested because the overall block was nonsignificant for group invariance.

[*] $p < .05$.

[**] $p < .01$.

[***] $p < .001$.