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The impact of school suspension on student tobacco use: A longitudinal study in Victoria, Australia and Washington State, United States

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Abstract

Context—School suspension may have unintended consequences in contributing to problem behaviors including school drop-out, substance use, and antisocial behavior. Tobacco use is an early-onset problem behavior, but prospective studies of the effects of suspension on tobacco use are lacking.

Method—Longitudinal school-based survey of students drawn as a 2-stage cluster sample, administered in 2002 and 2003 in Washington State, United States and Victoria, Australia. The study uses statewide representative samples of students in Grades 7 and 9 ($N = 3,599$).

Results—Rates of tobacco use were higher for Victorian than Washington State students. School suspension remained a predictor of current tobacco use at 12-month follow-up, after controlling for established risk factors including prior tobacco and other drug use for Grade 7 but not Grade 9 students.

Conclusions—School suspension is associated with tobacco use in early adolescence, itself an established predictor of adverse outcomes in young people. Findings suggest the need to explore process mechanisms and alternatives to school suspensions as a response to challenging student behavior in early adolescence.

Keywords

adolescence; tobacco; suspension; cross-national study; longitudinal study; risk factors

Introduction

Tobacco use has its onset in adolescence (Mathers, Toumbourou, Catalano, Williams, & Patton, 2006). In Australia, there has been a 50% decrease in adolescent tobacco use since 2001. However approximately 10% of adolescents (14 – 19 years) continue to engage in current tobacco use (daily, weekly, or less than weekly use) (Australian Institute of Health and Welfare, 2008). In the United States (U.S), approximately 7% of eighth-grade students (13 – 14 years) report using tobacco in the past month (Johnston, O'Malley, Bachman, & Schulenberg, 2008). This has potential long-term health implications given the link between tobacco use and adverse outcomes, including tobacco dependence and physical and mental health problems (Mathers, et al., 2006). Early onset of tobacco use is also predictive of later tobacco use (Scal, Ireland, & Wagman Borowsky, 2003b). For effective prevention, it is crucial to understand the factors that influence adolescent tobacco use. Surveys conducted following population reductions in adolescent tobacco use suggest that use is now strongly associated with problem behaviors such as antisocial peer affiliation and school problems (Kelly et al., in press). Few methodologically rigorous cross-national studies of the factors that influence adolescent tobacco use have been conducted to date. Further, several etiological studies of tobacco use have investigated individual, peer, school, and community predictors, few studies have examined the relative influence of school suspension which has shown a wide-ranging impact on adolescent problem behaviors. The current paper seeks to address these gaps in the literature.

The influences of a range of individual, peer, family, school, and community factors on the development of adolescent tobacco use have been studied. *Risk factors* are prospective predictors that independently increase the likelihood that an individual or group will engage in adverse outcomes (Hawkins, Catalano, & Miller, 1992a; National Crime Prevention, 1999). Prior tobacco use and alcohol and cannabis use are commonly reported risk factors for adolescent tobacco use (Derzon & Lipsey, 1999; Miller, Burgoon, Grandpe, & Alvaro, 2006; O'Loughlin, Karp, Koulis, Paradis, & DiFranza, 2009; Scal, Ireland, & Wagman Borowsky, 2003a; Sutherland & Shepherd, 2001; Van Den Bree, Whitmer, & Pickworth, 2004). Other individual level risk factors include engagement in violent (Derzon & Lipsey, 1999; Pollard, Hawkins, & Arthur, 1999) and delinquent behaviors (Tucker, Martinez, Ellickson, & Edelen, 2008). Engaging with peers who use tobacco increases the likelihood of tobacco use by as much as 60% (Kim, Fleming, & Catalano, 2009; Miller, et al., 2006).

A range of family and school factors are longitudinal predictors of tobacco use. Parent attitudes favorable to both drug use and delinquent behavior predict higher rates of adolescent tobacco use (Fagan, Van Horn, Hawkins, & Arthur, 2007). Further, family conflict, low levels of family involvement, and lack of family rules regarding drug use increase the likelihood of adolescent tobacco use (Abdelrahman, Rodriguez, Ryan, French, & Weinbaum, 1998; Hill, Hawkins, Catalano, Abbott, & Guo, 2005; Kim, et al., 2009; Vakalahi, 2002). School factors include low school commitment, poor academic performance, and dissatisfaction with school (Flay, Petraitis, & Hu, 1999; Hawkins, et al., 1992a; Mathers, et al., 2006; Newcomb & Felix-Ortiz, 1992; Soldz & Cui, 2001; Van Den Bree, et al., 2004). Finally, despite less research in this area, several community risk factors for adolescent tobacco use have been found, including neighborhood drug use (Abdelrahman, et al., 1998), low levels of neighborhood attachment, community norms and

laws favorable to drug use, and perceived availability of drugs within the community (Fagan, et al., 2007).

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 from pre-natal through adolescence, recognizing different contextual influences at different developmental periods (Catalano & Hawkins, 1996). The SDM integrates the main features of social control, social learning, and differential association theories of crime and delinquency and postulates that substance use (including tobacco use) originates with unhealthy beliefs and unclear standards, as well as bonds of attachment to deviant peers and others involved in substance use (e.g., family members and/or neighbours). Whether behavior is antisocial (e.g., substance use including tobacco use is illegal for adolescents) or prosocial depends on the preponderance protective or prosocial and risk or antisocial opportunities, involvements, and perceived rewards. The SDM also recognises that the factors that influence behavior differ according to age.

How the community responds to problem behavior (e.g., school suspensions, police arrests; in SDM terms external constraints on behavior) is also an important consideration which can influence the risk of tobacco use among youth (Hemphill, Toumbourou, Herrenkohl, McMorris, & Catalano, 2006). For young people to learn that certain behaviors are not acceptable, the community needs to inform them when their behavior is inappropriate and provide consequences that discourage them from engaging in such behavior. Students who engage in challenging behavior such as violence, antisocial behavior, and bullying are often excluded from school through the use of suspension. Studies in the U.S have shown that schools' suspension rates vary greatly (Skiba & Rausch, 2006a; Tara et al., 2003). In Victoria, Australia, and Washington State, U.S., recent student-reported rates of school suspension are 10.9% and 16.2% for boys, respectively, and 6% and 5.6% for girls, respectively, in Grades 7 and 9 (Hemphill, et al., 2006). Research in the U.S. shows that school suspension is used not only for serious behavioral transgressions that threaten the safety of the students themselves or others, but also for non-threatening behaviors such as repeated disruption in the classroom, talking back to the teacher, and wagging school (Skiba & Rausch, 2006b).

Evidence from existing studies shows that school suspension can have serious unintended negative consequences for the suspended student including intensifying academic difficulties, school drop-out, disengagement from school, alienation, crime and delinquency, and alcohol and drug use (Arcia, 2006; Butler, et al., 2005; Costenbader & Markson, 1998; Tara, et al., 2003). In two recent papers analyzing data from students aged 12 to 16 years, it has been shown that school suspension increases the likelihood of the student engaging in antisocial and violent behavior 12 months later, even after controlling for a comprehensive range of established risk and protective factors, including other school factors (e.g. academic failure and low school commitment) (Hemphill et al., 2009; Hemphill, et al., 2006).

There has been minimal research examining school suspension and its association with tobacco use (Conwell et al., 2003; Sutherland & Shepherd, 2001). The available cross-sectional evidence shows school suspension is a correlate of adolescent tobacco use (Conwell, et al., 2003; Sutherland & Shepherd, 2001). In their cross-sectional Australian study, Conwell and colleagues (2003) report significant positive associations between cigarette smoking at age 14 years and being suspended from school. In another cross-sectional study in the United Kingdom, Sutherland and Shepherd (2001) report the likelihood of tobacco use increases by a factor of 1.5 when an adolescent has been suspended from school. Further, Sutherland and Shepherd (2001) reported that the influence

of social factors on substance using behaviors may be age sensitive. The authors of the current paper expect that links between suspension and tobacco use will be more likely for students in early adolescence (age 12–13 years) when initial uptake of smoking occurs. Associations may be less apparent in mid adolescence (age 14–15 years) when smoking patterns are usually entrenched (Mathers, et al., 2006). Hence, the current paper separately examines associations between suspension and tobacco use for early and mid-adolescent students.

Despite the findings of cross-sectional studies, we were unable to locate any longitudinal studies of the effects of school suspension on tobacco use. There is a clear need for prospective, longitudinal studies in this area (American Psychological Association Zero Tolerance Taskforce, 2008), as suspension may have unintended consequences for tobacco use as has been demonstrated for other problem behaviors. The present study addresses these gaps in the research literature by examining the unique impact of school suspension on student tobacco use after other predictors have been taken into account in a prospective study in Victoria, Australia and Washington State in the United States, the International Youth Development Study (IYDS).

Although broadly similar in population size and student demographic characteristics (McMorris, Hemphill, Toumbourou, Catalano, & Patton, 2007), schools in Washington State and Victoria differ in their policies addressing problem behavior (i.e., antisocial behavior, substance use). For example, in Victorian government schools the emphasis is on maintaining student engagement at school. To reflect this, the 2009 Department of Education and Early Childhood Development's guidelines reduced the number of consecutive days a student can be suspended from school, as well as the total number of days a student can be suspended in one school year (Department of Education and Early Childhood Development, 2009). The guidelines describe a range of approaches to handling challenging student behavior, including the use of school-based restorative practices. The latter refer to a range of processes that view challenging behaviors as a fundamental violation of people and interpersonal relationships in schools and the community (Morrison, 2002) and seek to repair relationships and ensure perpetrators are held accountable (Shaw, 2007).

In contrast, a zero-tolerance approach (e.g., school suspension or expulsion) toward preventing challenging student behavior characterizes Washington State (consistent with other areas of the U.S.) (Casella, 2003). Consistent with these policy differences and the higher rates of suspension for males (Skiba & Rausch, 2006a, 2006b; Vavrus & Cole, 2002), students report more school suspensions in Washington State relative to Victoria (Hemphill, et al., 2009; Hemphill, et al., 2006). School suspension may impact student behavior in ways that *reduce* subsequent problem behavior (e.g., deter students from participating in further problematic behavior because of fear of repeated punishment) (Casella, 2003) or *increase* problematic behavior (e.g., due to interrupting student connections to school, increasing suspended student's contact with antisocial peers, increasing rebelliousness) (Casella, 2003; Costenbader & Markson, 1998). Given the differing policy contexts of the two countries, it is possible that school suspension may have differing cross-national impacts. Comparative cross-national studies of these two states with different policy approaches are helpful in providing added variation to examine predictive effects and for establishing whether effects are cross-nationally similar or different.

In the current paper, the main research question is whether school suspension has a unique effect on tobacco use across a 12-month period over and above established risk and protective factors using data from the IYDS for Grade 7 and 9 students. The hypotheses of this study are: (a) school suspension predicts tobacco use 12 months later, above and beyond

other risk factors for Grade 7 but not Grade 9 students; and (b) the impact of the risk factors including school suspension on tobacco use is similar in the two states.

Method

Participants

Participants were students enrolled in the IYDS; a longitudinal study examining the development of adolescent behaviors including substance use, antisocial behavior, and related problem behaviors, using standardized methodologies. The first survey was conducted in 2002, and surveys were repeated 12 months later. 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). Written parental consent was obtained prior to the survey for all participating students. Additionally, students provided their assent on the day of the survey to participate in the study. In Washington State 74.8% and in Victoria 73.5% of eligible students participated at the first survey. Non participation was predominately due to non-return on consent forms (11% in Washington State and 5% in Victoria). Previous research has described in detail student recruitment processes and participation rates (McMorris, et al., 2007).

To ensure sufficient variation in student scores on the key variables included in the analyses, useable data from Grade 7 and 9 students ($N = 3,599$) are analyzed in this paper. The sample consists of 1,726 Grade 7 students (833 Victorian [VIC] and 843 Washington State [WASH]), and 1,833 Grade 9 students (914 VIC and 919 WASH). Student sample characteristics are presented in Table 1. Female students comprised 51% of the sample. The mean age of students in both grade levels was slightly higher in Washington State. The majority of students in both Victoria and Washington State identified as being of Caucasian and White descent, respectively.

Procedures

Ethics approval—Ethics approval for this study was provided by the Royal Children's Hospital Ethics in Human Research Committee in Victoria, and the University of Washington Human Subjects Review Committee in the U.S. Permission to conduct this study in schools was provided in Victoria by the Department of Education and Training for government schools, and the Catholic Education Office for some private schools. In Washington State, school districts containing the sampled schools provided permission to conduct the study in schools. Furthermore, school principals in each state provided permission to conduct the study in their school.

Survey administration—In both states, surveys were administered in 2002 and 2003. To ensure seasonal equivalence, surveys in Washington State were administered over the period from February to June, and in Victoria from May to November. Survey staff were trained in a single survey administration protocol. Surveys took approximately 50–60 minutes to complete, and were administered to class groupings within the classroom setting. 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 survey, less than 4% at 12-month follow-up), over the telephone by study staff. Students in Victoria received a pocket calculator in 2002 after the return of their consent forms and a stress ball in 2003 after survey completion, and students in Washington State received \$10 after each survey.

Instruments

This study used the Communities That Care self-report youth survey (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Glaser, Lee Van Horn, Arthur, Hawkins, & Catalano, 2005; Pollard, et al., 1999). The survey draws on items from established large-scale studies such as Monitoring The Future (Bachman, Johnston, & O'Malley, 2001), the Seattle Social Development project (Hawkins et al., 1992b), the United States National Youth Survey (Elliott, Huizinga, & Menard, 1989), Health and Social Assessment (Weissberg, 1991), and the United States Federal Office of Juvenile Justice and Delinquency Prevention's National Youth Survey (Huizinga & Esbensen, 1988). The survey demonstrates good reliability and cross-sectional validity with large U.S. samples of students in Grades 6–12 (Arthur, et al., 2002; Glaser, et al., 2005; Pollard, et al., 1999), and has been successfully adapted for use in Victorian schools (Bond, Thomas, Toumbourou, Patton, & Catalano, 2000).

Current tobacco use—Current tobacco use was measured at both surveys by asking participants, “How frequently have you smoked cigarettes in the past 30 days?” on an 8-point Likert scale ranging from ‘*Not at all*’ to ‘*40 or more per day*’. Scores for current tobacco use at both surveys were recoded to form a dichotomous measure, *never or no use* (0) and *responses other than never or none* (1).

Risk factors—The risk factors measured at the first survey spanned individual, family, peer, school, community, and societal domains. The risk factors selected for analysis are those most likely to influence tobacco use in middle school students. Table 2 presents the summary statistics and alpha coefficients for the risk factors analyzed in this study. Individual risk factors were assessed using four scales. *Student favorable attitudes towards drug use* were measured using five items such as “How wrong do you think it is for someone your age to use marijuana (pot, weed, grass)?” Items were rated on a 4-point Likert scale of ‘*Very wrong* (0)’ to ‘*Not wrong at all* (4)’. Furthermore, items such as “How many times in the past year (12 months) have you carried a weapon?” were used to examine *student antisocial behavior*. An 8-point Likert scale ranging from ‘*Never* (1)’ to ‘*40+ times* (8)’ was used to measure these seven items.

Current alcohol and cannabis use were measured using items asking, “In the past 30 days on how many occasions (if any) have you: Had more than just a few sips of an alcoholic beverage (like beer, wine or liquor/spirits)?” and “In the past 30 days on how many occasions (if any) have you: Used marijuana (pot, weed, grass)?” Response options were rated on an 8-point Likert scale ranging from ‘*Never*’ to ‘*40 or more times*’. Scores for current alcohol and cannabis use were recoded to form a dichotomous measure *never or no use* (0) and *responses other than never or none* (1).

At the peer level of influence, *friends’ use of drugs* included four items such as “In the past year (12 months), how many of your best friends have smoked cigarettes?” Items were rated on a 5-point scale from *none of my friends* (0) to *4 or more of my friends* (4).

Two scales examined risk factors within the family domain. *Poor family management* was measured through nine items such as, “Would your parents know if you did not come home on time?” *Family conflict* was measured using three items including, “People in my family have serious arguments.” For both measures, items were rated on a 4-point Likert scale, from *definitely no* to *definitely yes*.

School risk factors were measured by two scales. *Academic failure* comprised two items asking students about their school grades in the past year (rated on a 5-point scale) and asking whether their school grades were better than most people in their class (rated on a 4-point scale). *Low commitment to school* included seven items rated on a 5-point scale that,

for example, asked students how interesting most of their school subjects are to them, and how often they enjoyed being in school.

Three scales measured community risk factors. *Community laws and norms favorable to drug use* included three items such as, “If a kid drank some alcohol (like beer, wine or liquor/spirits) in your neighborhood would he or she be caught by the police?” *Availability of drugs in the community* was measured by four items, including “If you wanted to get some cigarettes, how easy would it be for you to get some?” Levels of *community enforcement* were measured using three items such as “If a kid drank some alcohol (like beer, wine or liquor/spirits) in your neighborhood would he or she be caught by the police?” Items were rated on a 4-point Likert scale where higher scores reflected greater risk.

Societal responses to antisocial behavior were measured at the first survey by asking participants to report the number of times in the past year they had been suspended from school and arrested by police. Participants responded on an 8-point Likert scale, ranging from ‘Never’ to ‘40 or more times’. Scores on each societal response item were recoded to form a dichotomous measure of whether students had experienced suspension or arrest one or more times in the past year (responses other than never or none = 1; never or none = 0).

Student Honesty

Items were included to assess whether or not students answered the survey questions honestly. Students were categorized as dishonest if they reported any of the following: (a) that they were *not honest at all* when filling out the survey; (b) that they had used a fake drug in their lifetime or in the past 30 days; or (c) that they had used illicit drugs on more than 120 occasions in the past 30 days. A single, dichotomous measure of honesty was calculated using these items. Few students (17 at the first survey, 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.”

Statistical Analyses

In this paper, data are analyzed for 3,559 students ($n_{\text{Grade7}} = 1,726$, $n_{\text{Grade9}} = 1,833$). All analyses were performed using STATA IC software for Windows (version 10) (Statacorp, 2009).

Prevalence estimates were calculated to examine the rates of current tobacco use at the first and second survey. Prevalence estimates were calculated separately by gender and grade level and for students in Victoria and Washington State. All estimates were adjusted for nesting of students within schools and exact age at each time point. Independent *t*-tests and chi-square tests were conducted to compare scores on the first survey risk factors across states and grade levels.

Logistic regression analyses were performed for the combined Washington State and Victorian samples but separately for Grade 7 and 9 students to examine the relationships between current tobacco use at the second survey and first survey risk factors including school suspension and current tobacco use. First, a series of unadjusted logistic regression analyses were performed to determine if each first survey risk factor was associated with second survey tobacco use.

Second, hierarchical logistic regression analyses were performed, controlling for age, gender, school clustering, and first survey current tobacco use. Initially, second survey current tobacco use was regressed onto first survey demographic factors. Risk factors grouped by socialization domain were then sequentially added to the regression analyses in

the following order from the most to least proximal influence on students: individual, peer, family, school, community, and societal responses (suspension and arrests).

To investigate whether the impact of the risk factors including school suspension on tobacco use was similar in the two states, a third set of logistic regression analyses predicting second survey tobacco use was conducted to test interaction effects between state and each first survey risk factor, by multiplying each risk factor by state (coded 0 and 1). These analyses were conducted separately for Grade 7 and 9 students. Significant interaction terms from these regression analyses were added in a new final step to the fully adjusted model (Table 4). The R^2 for the model with interactions was compared with that of the model without interactions and showed little change (0.0017 and 0.0081 for Grades 7 and 9 respectively); the inclusion of interaction terms had minimal effect on the multivariate model. Hence, the fully adjusted analyses presented in Table 4 show the more parsimonious model without interaction terms.

Results

Descriptive statistics for risk factors

Table 2 shows the summary statistics for risk factors included in this study. Mean values for each risk and protective factor indicate higher levels of community availability of drugs and academic failure for Washington State students. In Victoria Grade 7 and 9 students report more student and parent attitudes favorable towards drugs, and higher levels of poor family management. Victorian students in Grade 9 report higher alcohol use, friends' use of drugs, and laws and norms favorable to drug use. Washington State students in Grade 7 report more engagement in antisocial behavior, and interaction with antisocial peers, and in Grade 9 report greater community availability of drugs and cannabis use. At both Grades 7 and 9, rates of school suspension are higher for Washington State students, and rates of police arrests are higher for Grade 9 students (see second half of Table 2).

Prevalence of tobacco use

Table 3 presents the tobacco use prevalence rates at the first and second surveys for Grade 7 and 9 boys and girls in Washington State and Victoria. In line with our first hypothesis, rates of first and second survey tobacco use were higher in Victorian boys and girls. Rates of tobacco use are higher for girls than boys in both states.

Longitudinal associations between risk factors and tobacco use

Table 4 presents unadjusted and adjusted logistic regression analyses predicting current tobacco use at the second survey. The unadjusted results show that, for both Grades 7 and 9 students, all of the first survey risk factors were associated with current tobacco use one year later. Only gender and age were not significant among the demographic variables. The hierarchical regression analyses modeled the influence of each risk factor domain in seven models. Only the results of Model 7 are presented in Table 4 because the preceding models showed similar results. Of the 18 risk factors modeled, 6 in Grade 7 and 5 in Grade 9 demonstrate unique effects when all predictors are entered simultaneously into the model. State and gender were significant demographic predictors for Grade 7, whereas only state remained a significant predictor at Grade 9. Living in Washington State was a protective factor for later tobacco use. Age changes from a risk factor in the unadjusted analysis to a protective factor in the adjusted analysis for Grade 9, demonstrating what is undoubtedly an artifactual suppressor effect. Current tobacco use at the first survey is the strongest risk factor, increasing odds fivefold at Grade 7 and sevenfold at Grade 9. Friends' use of drugs and current alcohol use are risk factors for both Grade 7 and 9. Community norms favorable to drug use, and community enforcement were risk factors in Grade 7. In Grade 9, predictors

included current cannabis use, and academic failure. For Grade 7 students, being suspended from school is linked to tobacco use, with the magnitude of the school suspension effect greater than the effects of gender, state, current alcohol use, friends' use of drugs, community norms favorable to drugs, and community enforcement.

Discussion

This large, cross-national study is unique in the comprehensive measurement of risk and protective factors and the use of identical data collection and management methods. School suspension was linked to an almost doubled likelihood of Grade 7 students using tobacco 12 months later, even after controlling for prior tobacco use, the use of alcohol and cannabis, antisocial behavior, other established risk factors, and state differences. However, school suspension was not significantly associated with subsequent tobacco use for Grade 9 students. There were no state differences in the predictors of tobacco use. However, there was clear state differences in rates of tobacco use, with higher rates in Victorian compared to Washington State students.

To the authors' knowledge, this is the first study of its kind to examine longitudinal effects of school suspension on tobacco use, using prospective data. The findings of this study extend the results of previous research demonstrating cross-sectional associations between school suspension and tobacco use (Conwell, et al., 2003; Sutherland & Shepherd, 2001). The study suggests that early adolescence may be the risk period for school suspension to influence tobacco use. The finding that for Grade 9 students, school suspension was not significantly associated with current tobacco use after controlling for other risk factors is not unexpected given that by Grade 9 patterns of tobacco use are typically entrenched (Mathers, et al., 2006).

An additional important finding of this study is that the risk factors including school suspension related to tobacco use 12-months later were similar in the two states for both Grade 7 and 9 students, as shown by the lack of interaction effects in the statistical analyses. Given the broad similarities in Victoria and Washington State, this finding is not surprising. However, given the apparent differences in school policy for dealing with challenging student behaviors, stronger associations between suspension and tobacco use might have been expected in Washington State. In general these results suggest that effective evidence-based programs for tobacco use prevention in the United States may also be applicable in Victoria and vice versa for Washington State.

The process by which school suspension increased the likelihood of subsequent tobacco use in this sample is unclear and requires additional research. Perhaps early adolescent students who experience suspension rebel by engaging in further problem behavior such as tobacco use. Alternatively, it is possible that suspending students from school may disconnect them from a positive social environment with healthy role models and increase their exposure to other risk factors for substance use (e.g., unsupervised time) (Casella, 2003). Students who are suspended from school may also experience a negative stigma within the school community (Costenbader & Markson, 1998) and change their behavior to fit the negative stigma. Another possibility is that school suspension increases tobacco use by promoting interaction between like-minded deviant young people not at school; for example, by providing the opportunity for those suspended to meet together while excluded from school. An examination of the correlations between school suspension and risk factors measured at the first and second survey showed the strongest associations were between suspension and interaction with antisocial friends and academic failure. Future research is required to explore these possible pathways in more detail. However, assisting high-risk students to maintain academic performance and facilitating interactions with non-deviant peers may be

important for reducing tobacco use. Some researchers would argue that measures of suspension simply reflect prior problem behavior including tobacco use; hence an association between the two is to be expected. However, this explanation is not consistent with the present analyses since they controlled for prior tobacco and substance use as well as antisocial behavior in examining the relationship with subsequent tobacco use. Additional research is required to explore whether other substance use may be prospectively related to school suspension.

Results in this study confirm the important role of friends' drug use in influencing both Grade 7 and 9 students' tobacco use (Derzon & Lipsey, 1999; Miller, et al., 2006; O'Loughlin, et al., 2009; Scal, et al., 2003a). Students with friends using drugs were more likely to use tobacco 12 months later. Likewise, the participants' own use of tobacco and alcohol at the first survey increased the likelihood of tobacco use 12 months later. Given that the participants in this study were 12 to 15 years old at the first survey, these findings highlight the risks of early tobacco and other drug use. Other studies have also shown similar results (Hawkins, et al., 1992a; Kim, et al., 2009; Scal, et al., 2003a; Van Den Bree, et al., 2004). In the current study, being female increased the likelihood of tobacco use at the second survey for Grade 7 students only. This finding is consistent with studies showing that young females increasingly take up tobacco use (Kaufman et al., 2002).

The current analyses clarify that school suspension is more common in Washington State, but acts cross-nationally as a similar prospective risk factor for subsequent tobacco use. The substantially higher prevalence of tobacco use and low rates of suspension in Victoria relative to Washington State suggests that risk factors other than school suspension underlie the observed state differences.

Strengths and limitations of the study

This study of links between school suspension and subsequent tobacco use in Victoria, Australia, and Washington State, U.S. has a number of strengths. First, this study is one of the first to ensure that the two sites have used the same recruitment, survey, and follow-up procedures, as well as the same data management practices (McMorris, et al., 2007). The use of identical procedures ensures that any state differences cannot be attributed to the design and methods of the study. Second, this study achieved good response rates for participation, it includes approximately equal numbers of male and female students in each state, and it has achieved a good sized sample across two different cohorts spanning 12 – 15 years of age. Third, the two states included in this study were chosen for their similarities on important socio-demographic characteristics and for their differences in policy around substance use and related behaviors (McMorris, et al., 2007).

Some potential limitations of the current study should be noted. First, the study uses student self-report data. However, the use of self-report measures in studies of pre-adolescents and adolescents is considered a reliable source of data for behavior problems such as substance use and antisocial behavior (Huizinga & Elliott, 1986; Jolliffe et al., 2003; Rutter & Giller, 1983) that are not readily visible to adults.

Second, the generalizability of the results in this study is limited to the states and grade levels examined here, however the sample is representative of these states and can therefore be applied with confidence to those groups (McMorris, et al., 2007). Third, given that some participants may have already engaged in tobacco use 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 current tobacco use (rather than initiation of tobacco use).

Fourth, the reasons for school suspension were not available in this study. The impact of suspension on student behavior may differ according to the type of challenging behavior for which the student was suspended therefore further research is needed to examine this question. Finally, there are likely to be other unmeasured characteristics of students and their environments that were not measured in this study and warrant exploration in relation to the links between school suspension and tobacco use, for example, socioeconomic and genetic differences.

Implications for health promotion & practitioners

Important goals for substance use prevention and therefore health promotion are to delay tobacco use in young people. This requires integrated efforts from parents, schools, and the broader community. For early adolescents, community acceptance of tobacco use by young people needs to be directly addressed as does availability of tobacco. To reduce community acceptance of tobacco use, adults require education about the negative health consequences of tobacco for students and disincentives for accepting tobacco use by students. Reducing the availability of drugs in the community is likely to minimize the opportunities for young people to use drugs with their friends.

Education and social exclusion are key determinants of health. Exclusionary school policies may place students in situations that reduce their future life opportunities and run counter to health promotion goals. School suspension, particularly in early adolescence, may affect tobacco use by providing opportunities for both unsupervised tobacco use and opportunities to interact with antisocial friends who use tobacco. If these pathways from school suspension to tobacco use are confirmed the way in which school suspension is implemented may require rethinking. For example, schools may need to work with parents to ensure that students suspended from school will be supervised by an adult. Providing students with schoolwork to complete with the expectation that it will be checked upon return to school may help students maintain academic performance while suspended. Reserving the use of school suspension for only the most serious transgressions of behavior that threaten the safety and wellbeing of students and staff may be important to keep most students engaged with school. Exploring the use of alternative student behavior management approaches such as school-based restorative practices or internal (within-school) suspension may also reduce the impact of school suspension on student substance use.

Conclusions

The findings of this paper show that in early adolescence students who were suspended from school are more likely to have used tobacco 12-months later despite controlling for a wide variety of alternative risk factors. These results are consistent with other studies of the impact of school suspension on student outcomes. However, this study is novel in showing the effects of suspensions in a prospective, cross-national study that adjusted for a range of established risk factors. A unique impact of suspension was detected above and beyond these established factors. Further longitudinal research is required to replicate these findings and to examine the possible pathways from school suspension to tobacco use. It is important that schools are mindful of the potentially detrimental effects of school suspension and reserve the use of suspension for the most serious behavioral student transgressions.

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Table 1

Description of the sample characteristics of Victorian ($n_{Grade\ 7} = 883$ and $n_{Grade\ 9} = 914$) and Washington State ($n_{Grade\ 7} = 843$ and $n_{Grade\ 9} = 919$) students at the first survey.

Characteristics	Victoria		Washington State	
Age				
Grade 7	Mean 12.92	SD 0.40	Mean 13.07	SD 0.41
Grade 9	Mean 14.89	SD 0.39	Mean 15.10	SD 0.46
Gender				
Female	51.18%		48.82%	
Ethnicity	Grade 7 (%)		Grade 9 (%)	
Washington State				
<i>White</i>	65.00		68.00	
<i>Hispanic/Latino</i>	16.00		11.00	
<i>African American</i>	4.00		4.00	
<i>Native American</i>	6.00		5.00	
<i>Asian/Pacific Islander</i>	6.00		10.00	
<i>Other</i>	3.00		2.00	
Victoria				
<i>Caucasian</i>	91.00		90.00	
<i>African</i>	0.70		0.70	
<i>Aboriginal and Torres Strait Islander</i>	1.00		0.70	
<i>Spanish/Hispanic/Latino</i>	0.40		1.00	
<i>Asian</i>	5.21		5.79	
<i>Pacific Islander</i>	0.90		0.30	
<i>Other</i>	1.00		2.00	

Table 2

Means, standard deviations and Cronbach alphas for risk factors measured at the first survey for the Victorian ($n = 1,747$) and Washington State ($n = 1,762$) samples.

Risk Factors	Grade 7				Grade 9			
	Victoria [Mean(SD)]	Washington State [Mean(SD)]	Victoria (α)	Washington State (α)	Victoria [Mean(SD)]	Washington State [Mean(SD)]	Victoria (α)	Washington State (α)
<i>Individual risk factors</i>								
Favorable attitudes towards drug use	1.41(0.53)***	1.28(0.51)	0.83	0.90	1.96(0.72)***	1.64(0.68)	0.86	0.89
Antisocial behavior	1.06(0.19)	1.11(0.27)***	0.38	0.37	1.14(0.35)	1.16(0.41)	0.61	0.61
<i>Family risk factors</i>								
Poor family management	1.61(0.48)**	1.54(0.51)	0.79	0.82	1.88(0.49)***	1.76(0.51)	0.77	0.79
Family conflict	2.16(0.78)	2.19(0.82)	0.81	0.80	2.36(0.75)	2.34(0.74)	0.77	0.79
Parent attitudes favorable to drug use	1.38(0.48)***	1.18(0.40)	0.72	0.83	1.71(0.62)***	1.33(0.51)	0.76	0.83
<i>Peer risk factors</i>								
Interaction with antisocial peers	0.19(0.33)	0.26(0.47)***	0.67	0.82	0.37(0.56)	0.34(0.57)	0.82	0.85
Friends' use of drugs	0.53(0.74)	0.54(0.84)	0.70	0.82	1.30(1.00)**	1.14(1.11)	0.75	0.84
<i>School risk factors</i>								
Academic failure	1.93(0.61)	2.10(0.73)***	0.66	0.72	2.06(0.67)*	2.00(0.72)	0.70	0.72
Low commitment to school	2.11(0.59)	2.13(0.59)	0.73	0.70	2.36(0.61)	2.32(0.56)	0.75	0.71
<i>Community risk factors</i>								
Laws and norms favorable to drug use	1.97(0.57)	1.93(0.62)	0.76	0.81	2.36(0.57)***	2.25(0.56)	0.75	0.77
Community enforcement	2.43(0.82)	2.42(0.88)	0.83	0.88	2.79(0.75)	2.85(0.75)	0.81	0.84
Community availability of drugs	1.69(0.72)	1.78(0.86)*	0.78	0.85	2.35(0.82)***	2.55(0.92)***	0.82	0.86
Victoria % Washington State %								
<i>Individual risk factors</i>								
Current alcohol use	31.14***		11.98		54.27***		24.59	
Current marijuana use	1.13		4.98***		7.00		12.51***	
<i>Societal Responses</i>								

Risk Factors	Grade 7			Grade 9		
	Victoria [Mean(SD)]	Washington State [Mean(SD)]	Victoria (α) [Mean(SD)]	Washington State (α) [Mean(SD)]	Victoria (α) [Mean(SD)]	Washington State (α) [Mean(SD)]
Suspension	6.00		12.22***	11.38	9.58	
Arrests	0.68		2.25**	2.52	4.90**	

* p < .05;

** p < .01;

*** p < .001;

α = Cronbach alpha

Table 3
Rates of current tobacco use in Grade 7 and 9 Washington State and Victorian students at the first and second surveys.

	Grade 7 Males				Grade 7 Females			
	Washington State		Victoria		Washington State		Victoria	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Survey 1 current tobacco use	4.68	2.45–8.73	7.06	4.82–10.21	5.14	2.98–8.72	9.39	6.37–13.62
Survey 2 current tobacco use	9.59	6.00–15.00	19.63**	12.74–29.00	14.65	8.65–23.73	21.29	13.63–31.66
	Grade 9 Males				Grade 9 Females			
	Washington State		Victoria		Washington State		Victoria	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Survey 1 current tobacco use	8.26	4.69–14.13	17.22*	13.61–21.53	10.87	7.71–15.11	26.12***	20.62–32.50
Survey 2 current tobacco use	17.05	11.23–25.02	29.55**	21.07–40.31	18.05	11.35–27.49	39.54***	26.06–54.82

Note. Female sample comprises 966 Grade 7 students at survey 1 and 963 Grade 7 students at survey 2, and 986 Grade 9 students at survey 1 and 984 Grade 9 students at survey 2. Male sample comprises 926 Grade 7 students at survey 1 and 923 Grade 7 students at survey 2, and 944 Grade 9 students at survey 1 and 939 Grade 9 students at survey 2; CI = confidence interval.

The presented estimates and confidence intervals were derived using the 'svyset' analysis technique in STATA. These estimates take into account the sample design weight, school nesting (strata), and age. Estimates have been adjusted for exact age at each survey, i.e., first survey exact age 13 years, second survey exact age 14 years (Grade 7); first survey exact age 15 years, second survey exact age 16 years (Grade 9).

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 4

Logistic regression analyses for the association between first survey risk factors and current tobacco use in Grade 7 and 9 students (12-month follow-up) ($n = 3,467$).

Risk Factors	Grade 7						Grade 9					
	Unadjusted Analyses		Fully Adjusted Analyses		Unadjusted Analyses		Fully Adjusted Analyses		Unadjusted Analyses		Fully Adjusted Analyses	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<i>Demographics</i>												
Gender (coded 0 = male, 1 = female)	1.56**	1.12–2.19	2.06***	1.39–3.07	1.22	0.96–1.55	1.15	0.84–1.57				
Age	1.55**	1.14–2.10	1.46	0.99–2.14	1.09	0.80–1.48	0.93	0.64–1.35				
State (coded 0 = Victoria, 1 = Washington State)	0.61*	0.40–0.92	0.56*	0.35–0.89	0.38	0.28–0.52	0.44	0.29–0.66				
<i>Individual factors</i>												
Current tobacco use	20.88***	13.60–32.07	5.87***	3.32–10.38	23.39***	16.70–32.76	7.38***	4.81–11.33				
Favorable attitudes to drug use	4.19***	3.24–5.43	1.05	0.66–1.68	3.80***	3.17–4.57	1.25	0.93–1.69				
Antisocial behavior	6.02***	3.53–10.27	1.42	0.59–3.39	2.87***	1.99–4.14	0.63	0.35–1.12				
Current alcohol use	5.62***	4.00–7.88	1.91**	1.21–3.03	6.24***	4.72–8.25	1.74**	1.23–2.46				
Current cannabis use	7.89***	4.91–12.66	0.56	0.25–1.26	7.54***	5.59–10.16	2.00**	1.19–3.34				
<i>Peer factors</i>												
Interaction with antisocial peers	3.61***	2.44–5.33	0.71	0.37–1.38	3.02***	2.38–3.85	1.06	0.72–1.57				
Friends' use of drugs	2.75***	2.32–3.27	1.84***	1.43–2.37	2.66***	2.33–3.04	1.38**	1.09–1.74				
<i>Family factors</i>												
Poor family management	3.50***	2.68–4.58	1.05	0.69–1.59	3.86***	3.05–4.89	1.30	0.91–1.84				
Conflict	1.86***	1.52–2.27	1.09	0.85–1.39	1.59***	1.35–1.86	0.94	0.73–1.21				
Parental attitudes favorable to drug use	2.98***	2.31–3.84	1.36	0.86–2.15	2.77***	2.27–3.38	0.92	0.65–1.30				
<i>School factors</i>												
Academic failure	2.64***	2.13–3.28	2.07	1.57–2.73	3.07***	2.57–3.66	1.71***	1.29–2.25				
Low commitment to school	3.02***	2.35–3.88	0.98	0.66–1.45	3.25***	2.66–3.98	1.25	0.89–1.76				
<i>Community factors</i>												
Norms favorable to drug use	2.56***	1.96–3.35	0.49*	0.26–0.93	2.55***	2.04–3.19	0.78	0.46–1.32				

Risk Factors	Grade 7				Grade 9			
	Unadjusted Analyses		Fully Adjusted Analyses		Unadjusted Analyses		Fully Adjusted Analyses	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Enforcement	1.90 ^{***}	1.54–2.34	1.65 [*]	1.05–2.58	1.50 ^{***}	1.27–1.77	1.10	0.77–1.57
Availability of drugs	2.16 ^{***}	1.78–2.62	1.14	0.83–1.55	2.03 ^{***}	1.74–2.37	1.20	0.92–1.56
<i>Societal responses</i>								
Suspension	3.68 ^{***}	2.38–5.69	2.08 ^{**}	1.23–3.52	3.93 ^{***}	2.82–5.47	1.10	0.66–1.81
Arrests	2.65 [*]	1.05–6.69	0.83	0.23–3.04	3.13 ^{***}	1.93–5.08	0.85	0.38–1.93
% variance explained		n/a		28.74		n/a		34.87

Note. The fully adjusted analyses control for age, gender, state, and first survey current tobacco use. OR = odds ratio and CI = confidence interval. ^ Odds ratios correspond to the dichotomous country variable (coded “0” for Victorian adolescents and “1” for Washington State adolescents) and dichotomous gender variable (coded “0” for male adolescents and “1” for female adolescents).

* $p < .05$;

** $p < .01$;

*** $p < .001$.