Drug and Alcohol Dependence 146 (2015) 68–74

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Neighbourhood crime and adolescent cannabis use in Canadian adolescents

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ARTICLE INFO

Article history:
Received 1 April 2014
Received in revised form
12 November 2014
Accepted 12 November 2014
Available online 22 November 2014

Keywords:
Cannabis use
Adolescence
Neighbourhood crime
Parental support
Peers

ABSTRACT

Background: Although neighbourhood factors have been proposed as determinants of adolescent behaviour, few studies document their relative etiological importance. We investigated the relationship between neighbourhood crime and cannabis use in a nationally representative sample of Canadian adolescents.
Methods: Data from the 2009/10 Canadian Health Behaviour in School-aged Children (HBSC) survey ($n = 9134$ 14- and 15-year-olds) were combined with area-level data on crime and socioeconomic status of the neighbourhood surrounding the schools ($n = 218$).
Results: Multilevel logistic regression analyses showed that after individual and contextual differences were held constant, neighbourhood crime related to cannabis use (OR 1.29, CI 1.12–1.47 per 1.0 SD increase in crime). This association was not moderated by parental support nor having cannabis-using friends. The amount of explained variance at the neighbourhood level was 19%.
Conclusions: Neighbourhood crime is an important factor to consider when designing interventions aimed at reducing adolescent cannabis use. Interventional research should examine the effectiveness of community-based interventions that target adolescents through parents and peers.

1. Introduction

Canadian adolescents report amongst the highest rates of cannabis use in the world. In 2010, 33% of Canadian 15-year olds reported having ever used cannabis, as compared to an international (Western) average of 17% (Currie et al., 2012). Although adolescent cannabis use declined between 2002 and 2010 in most Western countries, including Canada (Ter Bogt et al., 2013), cannabis remains the most commonly used illicit drug among 15-year olds (Johnston et al., 2014; Hibell et al., 2012).

Although few health effects of experimental or occasional cannabis use among adolescents are known, early and frequent use relate to a wide range of psychosocial and health problems, including cannabis dependence and the use of other illicit drugs (Fergusson et al., 2006; Hall, 2006; Hall and Degenhardt, 2009; MacLeod et al., 2004), cognitive impairment (Hall and Degenhardt, 2009), low educational attainment (MacLeod et al., 2004), memory and learning deficiencies (Solowij et al., 2011), problems at school and school drop-out (Hall, 2006; Hall and Degenhardt, 2009), increased risk of accidents and injuries (Hall and Degenhardt, 2009), externalizing problems such as delinquent and aggressive behaviours (Monshouwer et al., 2006), internalizing problems such as depression, anxiety and suicidal thoughts (Moore et al., 2007), and increased risks for psychotic disorders such as schizophrenia (Hall, 2006; Hall and Degenhardt, 2009; Moore et al., 2007). It is therefore a public health priority, particularly in Canada, to identify individual and contextual determinants of frequent cannabis use among adolescents. Such information will help inform the development of effective, targeted prevention programmes.

Although the residential neighbourhood is an important domain for adolescent development and behaviour (Bronfenbrenner,

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http://dx.doi.org/10.1016/j.drugalcdep.2014.11.005
0376-8716/

1979), neighbourhood factors have been understudied in relation to adolescent cannabis use, relative to family and peer contexts (Lambert et al., 2004). Social disorganization theory (Shaw and McKay, 1942) suggests that neighbourhood disadvantage may increase cannabis use through adolescents' exposure to deviant individuals and greater access to cannabis (Ter Bogt et al., 2006, 2013), environmentally induced stress, and less social control and monitoring (Sampson et al., 2002). Consistent with this theory, studies have found a relation between adolescent cannabis use and neighbourhood socioeconomic deprivation, residential instability, and racial and ethnic diversity (Bernburg et al., 2009; Brooks-Gunn et al., 1993; Fite et al., 2009; Furr-Holden et al., 2011; Jang and Johnson, 2001; Lambert et al., 2004; Leventhal and Brooks-Gunn, 2000; Mason and Mennis, 2010; Tucker et al., 2013). In addition, they have shown that perceived (disapproving) social norms relate to lower rates of adolescent cannabis use (Keyes et al., 2011).

The association between adolescent cannabis use and objective measures of neighbourhood crime has not been investigated yet. This is surprising as neighbourhood crime is a strong indicator of neighbourhood disadvantage, placing young people at risk of being confronted with threatening situations, negative role models, and increased disorganization. Only one study (Mason and Mennis, 2010) examined objective measures of neighbourhood crime as a potential determinant. This study found that the likelihood of adolescent cannabis use decreased as the residential distance to robbery increased. However, the generalizability of this finding is limited because this study (1) only included the occurrence of robbery, (2) was geographically limited to one urban setting in the United States, and (3) was limited to a sample of adolescents who were in treatment for substance use problems. There is a need for further examination of the association between more comprehensive neighbourhood crime indices and cannabis use using representative, preferably national, samples of adolescents from other countries and a diversity of contextual settings.

Ecological systems theory (Bronfenbrenner, 1979; Bronfenbrenner and Evans, 2000) posits that nested environmental contexts (e.g., neighbourhood crime and parenting practices) may interact to influence various adolescent behaviours. This approach is supported by more contemporary population health theory (Health Canada, 1996), which states that health is influenced by combinations of individual and contextual factors. Building upon these theories, it is relevant to examine whether individual-level factors moderate the association between neighbourhood crime and adolescent cannabis use. Two of the strongest predictors of adolescent cannabis use at the individual level are parental support (Barnes et al., 2006; Chen et al., 2005; Freeman et al., 2011a) and cannabis use among peers (Connell et al., 2010; Creemers et al., 2010; Duan et al., 2009). While high parental support may have a protective role, cannabis-using peers may function as a risk factor by increasing the availability of cannabis and opportunities for use.

Using a unique combination of administrative crime data at the neighbourhood level and individual-level data on adolescent cannabis use, the present study investigated relations between neighbourhood crime and adolescent cannabis use in a nationally representative sample of 14- and 15-year olds in Canada. Our analysis addressed three research questions: (1) does crime in school neighbourhoods relate to cannabis use among adolescents? (2) are such relations stronger for adolescents who perceive less support from parents, compared to adolescents who perceive more support from their parents? (3) are such relations stronger in adolescents who have more friends who use cannabis, compared to adolescents who have few or no friends who use cannabis? The answers to these questions may facilitate identification of at-risk youth as well as protective factors that attenuate the potential influence of neighbourhood crime on adolescent cannabis use. Because targeting high-risk schools is less stigmatizing than targeting high-risk individuals (Ennett et al., 1997), the present study may contribute to the development of interventions aiming to reduce adolescent cannabis use through neighbourhood, school and community projects.

2. Methods

2.1. Data sources

Relations between neighbourhood crime and adolescent cannabis use were examined using individual student-level data from the 2009/10 Canadian Health Behaviour in School-Aged Children (HBSC) survey (Freeman et al., 2011b), in combination with area-level geographic information system (GIS) measures of the socioeconomic status (SES; Statistics Canada, 2006) and crime rates (www.capindex.com) in the neighbourhoods surrounding the participating schools.

The HBSC study is a cross-national survey conducted in affiliation with the World Health Organization (Currie et al., 2012). The survey focuses on adolescent health, health behaviours, and the social context of health. The current analyses were limited to the most recent Canadian sample. This sample was designed using a variation of the international HBSC sampling protocol (Griebler et al., 2010; Roberts et al., 2009). The strategy followed a systematic multi-stage cluster technique, whereby individual students are nested in school classes that are nested within schools. The 2009/10 Canadian HBSC study included 26,078 students from 436 schools, with weighted distributions reflecting the distribution of Canadians in grades 6–10 (approximate age range 11–15 years). All provinces and territories in Canada participated with the exception of Prince Edward Island and New Brunswick. Students enrolled in private, special needs, or home schools, as well as incarcerated youth, were excluded; combined they constitute approximately 7% of the Canadian youth population. Consent was obtained and provided by school boards, individual schools, participants, and their parents/guardians. Consent was implicit or explicit depending on school board requirements. Response rates were 11/13 (84.6%) at the province/territorial level, 436/765 (57.0%) at the school level, and 26,078/33,868 (77.0%) at the student level. As questions on cannabis use were only asked to grade 9–10 students, grade 6–8 students were excluded from the analyses. This led to a sample of $N = 10{,}442$ adolescents. Of these, 9134 adolescents from 218 schools provided data on the question about cannabis use. Ethics approval was obtained from the General Research Ethics Board of Queen's University.

2.2. Measures

2.2.1. Individual characteristics.

2.2.1.1. Cannabis use. While lifetime use of cannabis can be considered normative to some extent (i.e., 33% of Canadian 15-year olds have used cannabis), frequent cannabis use is rare and considered an health risk behaviour (Ter Bogt et al., 2013). Students reported the frequency with which they had used cannabis in their lifetime on a scale that ranged from 1 to 7, with 1 = never, and 7 = 40 or more times. Students in the last category were characterized as *frequent lifetime users* and they were compared with those who reported never or less frequent lifetime use (as per Ter Bogt et al., 2006, 2013).

2.2.1.2. Parent–adolescent relationship. The parent–adolescent relationship scale was based on responses to the following statements: (a) My parents understand me; (b) I have a happy home life; (c) My parents expect too much of me; (d) My parents trust me; (e) I have a lot of arguments with my parents; (f) There are times I would like to leave home; (g) What my parents think of me is important; (h) My parents expect too much of me at school. Likert-like response options ranged from 1 = "strongly agree" to 5 = "strongly disagree". The scale is internally consistent ($\alpha = 0.83$) and was constructed by taking the mean of the 8 items, after items c, e, f and h were reverse coded (as per Freeman et al., 2011a,b; Pepler et al., 2013).

2.2.1.3. Cannabis use among friends. Students reported to what extent the following statement applied to them: "Most of the friends in my group have used drugs to get stoned". Response options were 1 = "rarely or never", 2 = "sometimes", 3 = "often", and 4 = "I do not know" (adapted from Johnston et al., 1980). For correlation and regression analyses, the fourth category was treated as a missing value.

2.2.2. Neighbourhood characteristics.

2.2.2.1. Crime. Neighbourhood crime was measured by means of the overall crime index of the Crimecast dataset (CAP Index, Inc., 2012; www.capindex.com). This crime index consists of a computer modelled crime score for each Census dissemination area in Canada for the year 2011. The scores are modelled by combining criminology data (nation and local police reports, client loss reports, offender surveys, and victim surveys) and demographic data (education, economic, population mobility, housing data, population data). Crime scores represent the probability that a certain crime will be committed in a given location, relative to national averages. Scores range from 0 to 2000, with the average score for all dissemination areas being 100. Scores are created for 7 types of crime: homicide, sexual assault,