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To cite this article: Philip Baiden, Shannon L. Stewart & Wendy den Dunnen (2014) Childhood abuse and cannabis use among adolescents with mental health needs in Ontario, Canada, Journal of Substance Use, 19:1-2, 18-24

To link to this article: <http://dx.doi.org/10.3109/14659891.2012.727522>



Published online: 06 May 2013.



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ORIGINAL ARTICLE

Childhood abuse and cannabis use among adolescents with mental health needs in Ontario, Canada

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Abstract

Objective: The purpose of this study was to examine the association between childhood abuse (emotional, physical and sexual abuse) and cannabis use among adolescents with mental health needs. **Methods:** Data on 3681 adolescent in-patients, 12–18 years old, were obtained from the Resident Assessment Instrument for Mental Health (RAI-MH). Using logistic regression, we estimated the odds of using cannabis by adolescents who experienced childhood abuse after controlling for age, gender, Aboriginal origin, problems with addiction, history of criminal justice involvement and symptoms of depression and mania. **Results:** There were 1844 adolescents, representing 50.1%, who reported using cannabis within the last 12 months. Controlling for demographic and patient characteristics, we found that cannabis use in the past year was strongly associated with childhood sexual and physical abuse. Compared to non-abused females, females who experienced sexual and physical abuse were more likely to have used cannabis. For males, the experience of physical abuse was marginally associated with cannabis use. **Conclusion:** The current data demonstrate the strong association between childhood sexual and physical abuse and cannabis use with a particularly strong association for females. Efforts aimed at treating cannabis use in adolescents who present with mental health needs should also consider their abuse histories.

Keywords

Childhood abuse, cannabis use, adolescents, mental health, RAI-MH

History

Received 23 April 2012
Revised 7 August 2012
Accepted 15 August 2012
Published online 6 May 2013

Introduction

Cannabis, also known as marijuana, remains the world's most widely used illicit substance and the age at first use is steadily decreasing in many Western countries (Atakan, 2008). The United Nations Office on Drugs and Crime (UNODC) estimates that, in 2009, about 4.5% of the world population (203 million people) aged 15–64 years had used cannabis at least once in the past year (UNODC, 2011). Use of cannabis among children and adults continues to increase in various regions of the world (Fischer et al., 2009; SAMHSA, 2010; Tjepkema, 2004). The World Drug Report of 2011 also reported that about 2.4 million children aged 12 years or older in North America, who had initiated drug use in the past year, used cannabis as their first drug (UNODC, 2011). Furthermore, Tjepkema (2004) analyzed data from the 2002 Canadian Community Health Survey and found that 12.2% of Canadians aged 15 and older admitted to using cannabis at least once in the past 12 months. Urbanoski et al. (2005) also found that one in three addiction treatment admissions in 2001 in Ontario were as a result of problem with cannabis use.

Childhood abuse and cannabis use

Childhood abuse can have a lasting and debilitating impact on the behavior of victims. Even though most survivors of childhood abuse are able to return to a normal level of functioning given time and support, this is not the case for every child, particularly those who experienced sexual abuse (Hyman et al., 2008; Khoury et al., 2010; Mathias et al., 2011; Widom et al., 2006). Some of these children may have stress reactions that fail to dissipate on their own, or may even deteriorate over time. These children compared to those children without abuse histories are more likely to suffer from post-traumatic stress disorder (PTSD) and relive their traumatic experiences later in life (Farrugia et al., 2011). Numerous studies have provided evidence to the effect that childhood abuse and substance use often co-occur (Gordon, 2002; Harley et al., 2010; Khoury et al., 2010; Marzoa et al., 2011; Mills et al., 2006; Reed et al., 2007; Widom et al., 2006). In these cases, the root of substance use is usually some form of abuse generally emanating from events in childhood (Farrugia et al., 2011; Gordon, 2002; Harley et al., 2010; Hyman et al., 2008; Marzoa et al., 2011). Several studies, both cross-sectional and longitudinal, have provided evidence that support this relationship (Dembo et al., 1989; Golub & Johnson, 2002; Gordon, 2002; Khoury et al., 2010).

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Some studies have shown that there is a high rate of comorbidity between substance use and other mental illness, particularly for individuals who suffered childhood abuse (Bujarski et al., 2012; Mills et al., 2006; Reed et al., 2007). Additionally, findings have shown that the association between childhood abuse and substance use is particularly strong for adolescents who experienced sexual abuse (Hyman et al., 2008; Widom et al., 2006). A study by Widom et al. (2006) found that although females reported lower rates of substance use than males, females who experienced sexual abuse and neglect were twice as likely to use marijuana during the past year and about four times more likely to report lifetime use of heroin. Lipschitz et al. (2003) also studied PTSD and substance use in inner-city adolescent girls and found that the majority of adolescents who experienced childhood sexual abuse subsequently develop substance abuse problems. Lipschitz and her colleagues (2003) found that up to 56% of adolescent females who experienced childhood sexual abuse were using marijuana, with one in three females getting high at least once a week. Furthermore, Harley et al. (2010) found that adolescents who experienced childhood trauma were approximately five times more likely to use cannabis than those who had not experienced childhood trauma. Mention should be made that the study by Harley et al. (2010) did not distinguish child physical abuse from child sexual abuse or witnessing domestic violence.

Even though cannabis is the most commonly used illicit substance in Canada, (Fischer et al., 2009; Patton & Bodnarchuk, 2004), few studies have explored the association between childhood abuse and cannabis use among adolescents with mental health problems. Studies from Europe, Australia and the United States have established the association between childhood abuse and cannabis use both among clinical and non-clinical populations. The use of cannabis and other illicit substances can impact the course of psychiatric treatment, particularly given the harmful effects of cannabis when combined with certain psychotropic medications that the adolescent in-patient may be taking concurrently (Stewart & Baiden, in press; Stewart et al., in press). Past studies have shown that there is almost double the risk of psychiatric readmission for frequent users of illicit drugs than for non-users (Menezes et al., 1996). In another study, Pencer et al. (2005) found that between 51% and 61% of adolescents with PTSD who used cannabis were readmitted 2 years after their first admission. Therefore, in this study, we examined the association between childhood abuse (emotional, physical and sexual abuse) and cannabis use among adolescents with mental health needs in Ontario, Canada. The main hypothesis underlying this study is that, controlling for demographic and patient characteristics, adolescents who experienced childhood abuse would be more likely to report cannabis use compared with non-abused adolescents. It was expected that all types of abuse (emotional, physical and sexual) would be related to cannabis use.

Methods

Participants and instrument

Data for the current study were obtained from the Resident Assessment Instrument for Mental Health (RAI-MH)

submitted to the Canadian Institute for Health Information (CIHI), Ontario Mental Health Reporting System, between October 2005 and March 2010. The RAI-MH data set included adolescent in-patients admitted into adult psychiatric hospitals in Ontario, Canada. The RAI-MH is a comprehensive, standardized instrument designed for use by mental health professionals (Hirdes et al., 2005). The instrument consists of items and definitions that serve as a guide in structuring clinical assessment and enables a service provider to assess key domains of functioning, mental and physical health, social support and service use. The instrument takes about an hour to complete and is completed by trained clinical hospital staff using all sources of information available, such as interviews with the patient, family and friends, clinical chart notes and clinical observation, just to mention a few. For a detailed description of the RAI-MH, see Hirdes et al. (2005) and Perlman & Hirdes (2008). The inter-rater reliability of the RAI-MH has been previously documented with an 83% average agreement for all items (see Hirdes et al., 2002). One additional advantage of using the RAI-MH data for this study is that the data are managed by CIHI. CIHI utilizes various data quality checks to ensure that the various data elements collected represent the actual characteristics of the patients at the time of assessment.

Participating facilities were determined by the Ministry of Health and Long Term Care – Ontario and include all adult in-patient psychiatry/mental health hospitals in Ontario, Canada. Ethics approval was granted by the University of Waterloo Office of Research Ethics. Adolescent in-patients were included in this study if they stayed for at least 3 days in the psychiatric hospital. The analyses presented in this study are based on the initial admission records of 3681 adolescents aged 12–18 years old ($M = 17.67$, $SD = 1.15$). Aspects of this data have been published in other publications by the authors.

Variables

The outcome variable, cannabis use was measured based on responses provided to the following item: “Time since use of cannabis.” Responses were coded as: “0 = if the adolescent has not taken cannabis at any time in the past year, or if cannabis was used but it was more than a year ago,” “1 = if cannabis was used in the past year, but not within the last 3 months,” “2 = if cannabis was used in the past 3 months, but not in the last month,” “3 = if cannabis was used in the last month, but not in the last 7 days,” “4 = if cannabis was used in the last 7 days, but not in the past 3 days,” and “5 = if cannabis was used in the last 3 days.” For the purposes of this study, cannabis use was measured as a binary variable and coded 1 if the adolescent reported using cannabis within the last 12 months (i.e., those who were coded 1–4); otherwise, it was coded as 0.

The main explanatory variables included in the analyses are lifetime experience of sexual, physical and emotional abuse. *Sexual abuse* relates to any form of non-consensual sexual contact (including but not limited to a child being subjected to non-consenting fondling, exposure of genitals, sexual intercourse/rape) experienced by the child. *Physical abuse* relates to any form of physical abuse experienced by the child (e.g. any incident resulting in non-accidental injury, physical

confinement, excessive physical discipline or withdrawal of necessities of life such as food and shelter). *Emotional abuse* relates to the ongoing emotional environment created by an abuser for the purposes of control such that the abused child's self-esteem, identity, energy, ability to feel and question, wants and needs are invalidated by the abuser (Hirdes et al., 2005). Even though reliability and validity of the items measuring abuse have not been tested in this study, these items have been used in past studies and found to be a good measure of traumatic life events (see, e.g. Mathias et al., 2011). These explanatory variables were measured as binary variables (equal to 1 if the abuse was ever experienced and 0 otherwise) and entered into the logistic regression analyses as dummy variables.

Demographic and control variables such as age, gender and Aboriginal origin were also included in the analyses based on past research identifying their importance to cannabis use. Age was measured as a continuous variable while adolescent gender and Aboriginal origin were treated as dummy variables with reference categories of females and non-Aboriginal, respectively. Lastly, we also included adolescents who reported having problems with addiction, as well as those with a history of criminal justice involvement. Both of these variables were measured as binary variables. Lastly, we controlled for symptoms of depression and mania in the multivariate model.

Statistical analyses

First, descriptive statistics of the outcome variable (cannabis use) and the explanatory and control variables were conducted to examine the means and standard deviations for the continuous variables and the percentage distribution for the categorical variables. This was done to provide preliminary insights into the general distribution of the variables to be used in the analyses. Next, a bivariate analysis was conducted to investigate the statistical association between cannabis use and the categorical explanatory variables. Here, we present the unadjusted odds ratio for cannabis use. Logistic regression was then performed using SAS PROC LOGISTIC (SAS Institute Inc., Cary, NC) to examine the association between childhood abuse and cannabis use. Logistic regression was chosen because cannabis use (the outcome variable) was measured as a binary variable and the explanatory and control variables were measured as categorical and interval/ratio variables. For the logistic regression model, we present the adjusted odds ratio for the increase or decrease in the likelihood of using cannabis while controlling for the effect of other variables. The goodness-of-fit (GOF) of the models was assessed by calculating the Hosmer–Lemeshow test statistic with non-significant values indicating that the data adequately fit a logistic function (Hosmer & Lemeshow, 1989). The predictive performance of the model was assessed using the *C*-statistic. The *C*-statistic is a term similar to the area under a receiver operating characteristic (ROC) curve (Cook, 2008; Hanley & McNeil, 1982). Generally, the *C*-statistic ranges from 0.5 (no predictive ability) to 1

(perfect discrimination) (Cook, 2008). Variables were deemed significant if the *p* value was less than 0.05. All analyses were performed using SAS version 9.2 (SAS Institute Inc., Cary, NC).

Results

Sample characteristics

The sample used for this study consists of 3681 adolescents, between the ages of 12 and 18 years, who were admitted to adult in-patient mental health beds in Ontario, Canada. The average age of adolescents in the study sample was 17.67 years ($SD = 1.15$) and a little over half (51.1%) were males. There were 1844 adolescents, representing 50.1%, who reported using cannabis within the last 12 months. About 6% of the study sample was of Aboriginal origin. About one in four adolescents (23.7%) had problems with addiction, and 8.2% had a history of involvement with the criminal justice system. In terms of history of abuse, about one in three adolescents (32.8%) in the study sample were emotionally abused, 22.2% were physically abused and 18.5% were sexually abused. Lastly, average mania and depression scores were 2.93 and 3.14, respectively (see Table 1).

At the bivariate level, all three forms of childhood abuse examined in this study were significantly associated with cannabis use. Fifty-four percent of adolescents who were emotionally abused compared to 48% of adolescents who were not emotionally abused used cannabis ($OR = 1.29, p < 0.001$). Approximately 58% of adolescents who suffered physical abuse reported using cannabis compared to 47.8% of those who did not suffer physical abuse ($OR = 1.53, p < 0.001$). In terms of sexual abuse, 58.1% of adolescents who were sexually abused compared to 48.3% of adolescents who were not sexually abused used cannabis ($OR = 1.48, p < 0.001$). Also, adolescents were more likely to have used cannabis if they

- were males ($OR = 1.29, p < 0.001$)
- were of Aboriginal origin ($OR = 2.43, p < 0.001$) compared to adolescents with non-Aboriginal origin
- had problems with addiction ($OR = 12.22, p < 0.001$)
- had a history of involvement with the criminal justice system ($OR = 2.64, p < 0.001$)

Table 1. Descriptive characteristics of adolescents admitted to adult in-patient mental health beds in Ontario.

Characteristics	Mean	<i>SD</i>	%	Total frequency
Age	17.67	1.15		3681
Gender – male			50.1	3679
Aboriginal origin			6.5	3681
Cannabis use			50.1	3681
Problems with addiction			23.7	3681
Involvement with the criminal justice system			8.2	3681
Emotional abuse			32.8	3681
Physical abuse			22.2	3681
Sexual abuse			18.5	3681
Maniac symptoms score	2.93	3.64		3681
Depression rating scale	3.14	2.63		3681

Note: $N = 3681$.

Table 2. Adjusted and unadjusted odds ratio (OR) for the likelihood of using cannabis.

Characteristics	Percentage that used cannabis	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Emotional abuse			
Never	48.0		
Abused	54.3	1.29 (1.12–1.48)***	1.04 (0.86–1.27) ns
Physical abuse			
Never	47.8		
Abused	58.3	1.53 (1.30–1.79)***	1.28 (1.02–1.60)*
Sexual abuse			
Never	48.3		
Abused	58.1	1.48 (1.25–1.76)***	1.49 (1.19–1.85)***
Gender			
Female	44.3	1.00	
Male	55.7	1.58 (1.39–1.80)***	1.53 (1.30–1.79)***
Aboriginal origin			
Non-Aboriginal	48.7	1.00	
Aboriginal	69.8	2.43 (1.82–3.22)***	2.22 (1.62–3.03)***
Problems with addiction			
No	38.2	1.00	
Yes	88.3	12.22 (9.81–15.23)***	10.85 (8.68–13.57)***
Involvement with the criminal justice system			
No	48.2	1.00	
Yes	71.1	2.64 (2.04–3.42)***	1.65 (1.23–2.22)***
Age			1.15 (1.07–1.22)***
Maniac symptoms			1.03 (1.00–1.05)*
Depression			1.01 (0.98–1.04) ns
C-statistic			0.75
Hosmer–Lemeshow GOF test (sig)			10.68 (0.220)

Notes: * $p < 0.05$; *** $p < 0.001$; ns = not significant.

The column unadjusted OR (95% CI) relates to the bivariate results whereas the column adjusted OR (95% CI) relates to results from the multivariate logistic regression model. The logistic regression model controlled for the cluster variable (hospital).

All three forms of abuse were found to be associated with cannabis use at the bivariate level; because there were no controls at this level, the relative impact of other variables in explaining cannabis use could not be assessed. Hence, at the multivariate level, we controlled for other theoretically relevant variables that might influence cannabis use. The overall predictive performance of the model was good as 75% of adolescents were correctly classified into cannabis users versus non-users and the Hosmer–Lemeshow chi-square GOF test was also statistically non-significant ($\chi^2 = 10.68$, $p = 0.220$), indicating the relative contribution of both the explanatory and control variables in explaining cannabis use (see Table 2).

No significant association was found between emotional abuse, depression and cannabis use. However, we found that adolescents who suffered physical abuse were 1.28 times more likely to have used cannabis compared to their counterparts who were not physically abused, holding all other explanatory variables constant ($OR = 1.28$). Compared to adolescents who were not sexually abused, sexually abused counterparts were more likely to have used cannabis ($OR = 1.49$). Compared to females, odds are 53% higher for males to have used cannabis ($OR = 1.53$). Adolescents of Aboriginal origin were 2.22 times more likely to have used cannabis when compared to adolescents of non-Aboriginal origin ($OR = 2.22$). The results also indicate that adolescents who had problems with addiction were ten times more likely to have used cannabis ($OR = 10.85$) and adolescents with a history of involvement with the criminal justice system were about 65% more likely to have used cannabis ($OR = 1.65$). We also found a significant association between age and cannabis use. For every increase in age by

one year, cannabis use is estimated to increase by a factor of 15% ($OR = 1.15$). Also, for every increase in mania symptoms, the odds of cannabis use are estimated to increase by a factor of 3%, and this result is statistically significant.

Lastly, we sought to investigate whether there exist gender differences in abuse rates and cannabis use. For adolescent females, we found that those who were sexually abused were 1.64 times more likely to have used cannabis compared to their counterparts who were not sexually abused ($OR = 1.64$). Also, adolescent females who were physically abused were 1.47 times more likely to have used cannabis compared to their counterparts who were not physically abused ($OR = 1.47$). Adolescent females who experienced emotional abuse were not statistically different from their non-abused counterparts in terms of cannabis use. For adolescent males, only physical abuse was found to be marginally associated with cannabis use (see Table 3).

Discussion

The objective of this study was to examine the association between childhood abuse and cannabis use among adolescents with mental health needs in Ontario, Canada. Findings partly confirm our hypothesis that childhood abuse is associated with cannabis use. That is, even though no significant association was observed between emotional abuse and cannabis use at the multivariate level, both sexual abuse and physical abuse were found to be significantly associated with cannabis use. Fifty percent of adolescents reported using cannabis in the last 12 months. This proportion is comparable to those reported in other studies. For instance, Widom et al. (2006) found that

Table 3. Logistic regression of gender differences in abuse rates and cannabis use.

Characteristics	Males		Females	
	Odds ratio	95% CI	Odds ratio	95% CI
Emotional	0.96 ns	0.75–1.22	1.13 ns	0.88–1.45
Physical abuse	1.30*	0.95–1.76	1.47**	1.12–1.92
Sexual abuse	1.30 ns	0.88–1.92	1.64***	1.30–2.08
C-statistic	0.52		0.60	
Hosmer–Lemeshow GOF test (sig)	2.25 (0.325)		0.609 (0.962)	

Notes: * $p = 0.09$; ** $p < 0.01$; *** $p < 0.001$; ns = not significant.

The logistic regression model controlled for the cluster variable (hospital).

80% of their participants reported having ever used cannabis before with 27% reporting past year use. A survey conducted among Australian school students found that 36% of children between the ages of 12 and 17 years old had used cannabis (Lynskey et al., 1999). Also, Johnston et al. (2000) analyzed data from the 1999 National Survey Results on Drug Use and found that lifetime use of cannabis was reported by 50% of high-school seniors. Per the design of our study, patients were asked the question time since use of cannabis. We believe that in some instances, some adolescents might have used cannabis more than once. In future studies, we hope to categorize cannabis users into daily, regular and occasional users.

Findings from the present study evidenced a significant age and gender effect in cannabis use. The findings on the significant association between age and cannabis use among adolescents with mental health are consistent with prior published studies (Atakan, 2008; Johnston et al., 2000). In this study, although males were more likely to have used cannabis, the proportion of adolescents using cannabis was quite high for both genders (52.5% for males and 42% for females). The extant literature on the effect of gender on cannabis use among adolescents with mental health is conflicting. Whereas past studies found both prevalence and frequency of cannabis use to be higher among adolescent males than their female counterparts (Farrugia et al., 2011; Hall et al., 1999; Widom et al., 2006), others (Dembo et al., 1989; Reid et al., 2000; Rey et al., 2002) found prevalence rates among adolescent females to be on the increase, resulting in a narrowing gender gap.

Although we hypothesized emotional abuse to be associated with cannabis use, we failed to find support for the hypothesis that when controlling for the effect of other factors, adolescents who were emotionally abused would differ from their counterparts who were not emotionally abused in using cannabis. Unlike physical and sexual abuse, which are marked by an explicit event, the very nature of emotional abuse makes it complex to conceptualize. There are various forms and modes that constitute emotional abuse, which some adolescents may not be aware of (Glaser, 2002). However, we found that adolescents who were sexually abused or physically abused were more likely to use cannabis. Further examination of gender differences suggests that females who were sexually or physically abused were more likely to have used cannabis compared to their non-abused female counterparts. For males, the experience of physical abuse was marginally associated with cannabis use. Our findings are consistent with previous studies in other jurisdictions that have found that adolescents who were

sexually abused or diagnosed with PTSD often resort to substance use as a coping mechanism (Harley et al., 2010; Khoury et al., 2010; Rey et al., 2002; Widom et al., 2006). The desire to self-medicate or reduce mood symptoms associated with stress response has been argued as one of the reasons behind substance use by adolescents who have experienced childhood abuse (Bujarski et al., 2012; Hyman et al., 2008; Khoury et al., 2010).

Problems with addiction and history of involvement with the criminal justice system were found to be associated with cannabis use. Numerous past studies have demonstrated a strong link between substance use and involvement in criminal behavior among adolescents (see, e.g. Barnes et al., 2002; Goldstein, 1985). Barnes et al. (2002) and Goldstein (1985) found substance use predicted engaging in criminal activity or delinquency. However, D'Amico and her colleagues (2008) found reciprocal effects between the temporal ordering of criminal behavior and substance use among adolescents suggesting that criminal behavior and delinquency could precede substance use. Other studies also support the notion that involvement with criminal activity may predict cannabis use (Dembo et al., 2002; van den Bree & Pickworth, 2005). For instance, van den Bree and Pickworth (2005) found that delinquency among adolescent students predicted initiation and progression to regular use of marijuana. In their longitudinal studies, D'Amico et al. (2008) found delinquent behavior (measured as interpersonal, property and drug-related offences) to predict future substance use across the four waves of their study. The major explanation offered for this reason is that engaging in criminal activity provides a conducive environment to subsequent substance use (D'Amico et al., 2008; van den Bree & Pickworth, 2005).

The current study is not without limitations. The sample, although relatively large, consisted of adolescents admitted into adult mental health facilities (see also Stewart Stewart et al., in press), which could compromise the extent to which findings from this study could be generalized to other populations as these adolescents tend to be older than those in adolescent-centred facilities (see also Stewart & Baiden, in press; Stewart et al., in press). Also, this study is limited by the cross-sectional nature of the data, which impedes the ability to make causal inferences. In other words, we were unable to establish the temporal order of effects between cannabis use and some of the explanatory variables. For instance, it was difficult to tell whether history of involvement with the criminal justice system preceded cannabis use or

whether the abuse event took place before cannabis use. In addition, some of the constructs were assessed by relying on retrospective self-report provided to mental health care professionals. Responses provided to some items could be affected by individual inaccuracies, memory biases or the assessor's judgement. Despite these limitations, it seems reasonably fair to conclude that the findings presented in this study support the argument that over and above other demographic factors, childhood abuse is associated with cannabis use.

In summary, this study has managed to demonstrate that adolescents who were physically and sexually abused are more likely to be using cannabis. This finding underscores the importance of childhood abuse in cannabis use. Further replication is required to confirm or refute our findings. Clinicians working with adolescents with mental health needs and substance use problems should be cognizant of their childhood abuse history and plan for appropriate treatment interventions. Appropriate trauma-based interventions, such as trauma-focused cognitive behavior therapy, may be considered when treating youth with a history of childhood abuse.

Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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