Investigating Cannabis Use Normalization by Distinguishing Between Experimental and Regular Use: A Multilevel Study in 31 Countries

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ABSTRACT. Objective: This research examined whether national population-level cannabis frequency rates moderate the strength of the relationship between individual-level psychosocial and behavioral risk factors (poor parental communication, bullying, fighting, etc.) and different levels of adolescent cannabis use (abstinence, experimental use, and regular use). **Method:** Data from the 2009/2010 Health Behaviour in School-Aged Children survey (N = 62,009, age = 15 years) from 31 countries were analyzed using multinomial hierarchical linear modeling. **Results:** Analyses showed that adolescents who reported experimental cannabis use and who lived in relatively high cannabis frequency countries were less likely than their counterparts in low cannabis frequency countries to present some of the cannabis-related psychosocial and behavioral risk factors. Conversely, regular cannabis use tended to occur among high-risk adolescents to an equal degree in high and low cannabis frequency countries. **Conclusions:** The findings suggest that the normality of cannabis use in the youth population is important to consider when investigating the relationship between risk factors and cannabis use. (*J. Stud. Alcohol Drugs, 76,* 181–189, 2015)

CANNABIS IS THE MOST WIDELY USED illicit substance in the world, with particularly high prevalence rates among adolescents (European Monitoring Centre for Drugs and Drug Addiction [EMCDDA], 2011; United Nations Office on Drugs and Crime [UNODC], 2011). Adolescent cannabis use has been linked to adverse outcomes including poor psychosocial functioning (Hall & Degenhardt, 2014; van Gastel et al., 2013), mental health disorders (Hall & Degenhardt, 2014; Lev-Ran et al., 2014; van Gastel et al., 2013), low educational achievement (Bachman et al., 2008; Fergusson et al., 2003), greater likelihood of other illicit drug use, and risks for dependence (Hall & Degenhardt, 2014). A number of these risks increase with younger age at initiation (Hall & Degenhardt, 2014).

Conventional theories such as Problem Behavior Theory (Jessor & Jessor, 1977), Social Control Theory (Hirschi, 1969), and the Social Development Model (Hawkins & Weis, 1985) have attempted to explain adolescent cannabis use as a consequence of individual and psychosocial risk factors (e.g., weak social bonds to parents and school and risk behaviors). Although these frameworks diverge in relation to the fundamental theoretical mechanisms, they share the underlying assumption that cannabis use is likely to be associated with other problem behaviors and that much of this association arises from common school and family risk factors (Gottfredson & Hirschi, 1990; Hirschi, 1969; Jessor & Jessor, 1977).

The pertinent risk-focused research has provided evidence for a range of psychosocial and behavioral risk factors for adolescent cannabis use, including fighting and bullying (Hemphill et al., 2011; Kim et al., 2011; Norström & Rossow, 2014), low academic achievement (Macleod et al., 2004; Ravens-Sieberer et al., 2004), and poor relationship with teachers (Sznitman & Romer, 2014; Sznitman et al., 2012) and parents (Luk et al., 2010; Piko & Kovács, 2010; Windlin & Kuntsche, 2012). Nevertheless, and partly as a result of observations of rapid increases in adolescent cannabis use during the 1990s (Bachman et al., 1998; EMCDDA, 2008; Parker et al., 1998) and the persistent high rates ever since (Currie et al., 2012; Sandberg, 2013), it has been argued that adolescent cannabis use is a normative behavior among young people in contemporary societies (Parker, 2003; Parker et al., 2002). In this vein, the Normalization

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Theory, first coined by Parker, is a theoretical framework that attempts to explain widespread substance use among "well-adjusted and successful goal oriented, non-risk taking young persons" (Parker, 1997, p. 25). The Normalization Theory suggests that widespread use signals a shift in the recruitment of people who use drugs, from primarily attracting adolescents with pre-existing tendencies to test limits and violate norms to more commonly attracting mainstream adolescents who are reasonably well-adjusted and bonded to conventional society (Parker et al., 2002). As a consequence, high substance use prevalence rates are expected to alter the association between psychosocial and behavioral risk factors and adolescents' tendency to engage in substance use. More specifically the association is expected to become weaker with higher cannabis use prevalence rates (Sznitman, 2007).

Sznitman et al. (2013) recently tested this aspect of the Normalization Theory by examining whether national population-level alcohol, cigarette, and cannabis prevalence rates moderate the strength of the relationship between individual-level psychosocial and behavioral risk factors and individual-level substance use in adolescents. Results showed that drunkenness and alcohol and cigarette use during the previous month reached greater than 40% in some of the 35 countries studied and that adolescents who reported last-month use of these substances were less likely to report psychosocial and behavioral risk factors in high-prevalence countries than in low-prevalence countries. However, no such pattern was found for last-month cannabis use, and it was thus concluded that although evidence exists for normalization of last-month alcohol use, cigarette use, and drunkenness, recent cannabis use cannot be said to be normalized. The researchers noted that the lack of evidence of cannabis normalization may be attributable to the relatively low prevalence rates of last-month cannabis use in all the studied countries (highest national prevalence rate was 18%). As such, one of the preconditioned criteria for normalization, namely, that it is a relatively common behavior, was not reached.

Another reason for why no evidence for cannabis normalization was found in the Sznitman et al. (2013) study may be that no distinction was made between different patterns of cannabis use. Research from the United States (Johnston et al., 2011) and Europe (Hibell et al., 2011) shows that experimentation with cannabis is relatively acceptable among young people, whereas regular use is not. Studies also show that differentiating between different patterns of cannabis use is important in terms of understanding how cannabis use is associated with psychosocial adjustment. One study that differentiated between abstainers (defined as no lifetime use), experimenters (defined as adolescents who reported cannabis use one to two times a month or less), and frequent users (defined as adolescents who reported weekly cannabis use or more) found that experimenters exhibited better adjustment than abstainers and regular cannabis users (Shedler & Block, 1990). Likewise, other studies have found that adolescents who report regular cannabis use have a greater likelihood of encountering detrimental consequences than do their peers who briefly use or ever experiment with cannabis (Lynskey et al., 2003; Swift et al., 2008).

Current study

In sum, research suggests that, when testing the underlying assumptions of the Normalization Theory, it is important to distinguish between experimental and frequent cannabis use. Indeed, taking previous studies together, it seems unlikely that frequent use of cannabis is normalized in the general youth population. However, it may be possible that cannabis experimentation is normalized. The objective of the current study was to test the underlying assumption of the Normalization Theory that national prevalence rates will moderate the association between risk factors and cannabis use and to examine whether the moderating effect is stable across experimental and regular cannabis use. This endeavor is important in order to reach a better understanding of contemporary patterns of adolescent cannabis use and in turn to generate information that can be used to develop more effective drug policy strategies.

According to the Normalization Theory, high substance use prevalence in a social context indicates mainstream adoption and thus a relatively high rate of substance use among low-risk youth (Parker et al., 2002). As such, the Normalization Theory assumes that family, school, and behavioral risk factors will be weaker predictors of cannabis use when country-level cannabis use is high compared with when it is low. Furthermore, the studies reviewed above suggest that there are at least three reasons normalization may be expected to have occurred for experimental but not regular use of cannabis: (a) experimental use is more common than regular cannabis use (Hibell et al., 2011; Johnston et al., 2011), (b) adolescents tend to be more accepting of experimental use than of regular cannabis use (Hibell et al., 2011; Johnston et al., 2011), and (c) experimental cannabis users may be better adjusted than both abstainers and regular users (Shedler & Block, 1990).

Based on this background, the current study hypothesized that evidence for cannabis normalization would be found for experimental but not regular cannabis use. No study has previously tested cannabis normalization with careful consideration of different levels of use. One reason for the lack of studies in this area may be the scarcity of appropriate data. An examination of the systematic relationship between national frequency rates and risk profiles of adolescent cannabis users requires comparative cross-national data from many countries, and such data are rare. In the current study, data from the Health Behaviour in School-aged Children (HBSC) study were used (Currie et al., 2012). These data offer an exceptional opportunity to explore cannabis use normalization because

Table 1. Sample sizes and national cannabis prevalence rates

Countries	Sample size	% Abstinent	Experimental cannabis use, %	Regular cannabis use, %
Austria	1,820	86.94	10.25	2.81
Armenia	915	96.65	2.93	0.42
Belgium	2,567	79.79	15.53	4.68
Canada	5,441	66.33	23.65	10.02
Croatia	2,424	86.85	11.17	1.97
Czech Republic	1,522	69.53	26.78	3.70
Denmark	1,226	85.34	13.32	1.34
Estonia	1,398	78.86	19.73	1.41
Finland	2,110	90.85	7.95	1.20
France	1,906	73.22	20.58	6.21
Germany	1,640	89.19	9.45	1.37
Greece	1,648	92.87	5.38	1.75
Hungary	1,733	85.68	12.78	1.54
Iceland	3,680	91.52	6.92	1.56
Ireland	1,695	85.04	11.09	3.87
Israel	1,352	94.54	4.00	1.47
Latvia	1,375	75.68	21.41	2.90
Lithuania	1,792	78.78	19.59	1.62
Luxembourg	1,382	81.90	13.95	4.15
Netherlands	1,457	79.76	16.49	3.75
Norway	1,339	94.68	4.07	1.25
Poland	1,410	81.52	15.70	2.78
Portugal	1,553	89.23	8.56	2.21
Romania	2,002	91.71	7.42	0.87
Slovakia	1,914	83.25	14.93	1.82
Slovenia	1,815	76.73	18.52	4.75
Switzerland	2,246	70.77	23.10	6.13
Ukraine	1,897	89.43	9.51	1.06
Macedonia	1,536	97.24	2.14	0.62
United Kingdom	5,322	80.50	15.33	4.17
United States	1,892	72.05	20.13	7.82
Total	62,009	82.40	14.09	3.51

Note: Data are based on 2009/2010 Health Behaviour in School-Aged Children data.

the HBSC gathers comparative cannabis use and risk factor data from adolescents across 31 countries/regions, using the same mandatory questionnaire, and thus enables a comparison of adolescent risk profiles across different levels of national cannabis use frequency rates.

Method

Data used in the current study are from the 2009/2010 HBSC study in which 43 countries/regions participated. The HBSC gathers data in nationally representative samples of 11-, 13-, and 15-year-olds. The primary sampling unit is the school class. A random sample is selected, with some countries stratifying by region, school type, or geography and others using a simple random sample. HBSC data are collected with anonymous self-report questionnaires that are distributed in the classroom. Each participating country obtained approval to conduct the survey from the relevant ethics review board or equivalent regulatory institution (Currie et al., 2012).

In 2009/2010, 207,334 adolescents participated in the HBSC survey, with response rates for schools reaching greater than 70% in most countries (Currie et al., 2012). Of the 43 countries/regions taking part in the survey, the current analyses excluded 12 countries that did not have data on cannabis use. Eleven-year-olds and 13-year-olds were also excluded because cannabis-related questions were not gathered from these age cohorts, thereby providing a sample of 62,009 15-year-old respondents (see Table 1 for a detailed overview). Another 1,510 respondents (2.4%) were excluded from multivariate analysis because of missing data on variables of interest. For further general information about the HBSC data, see Currie et al. (2012) and Roberts et al. (2009).

Measures

For complete details of the mandatory questionnaire, including theoretical rationale and measures of reliability and validity, see the 2009/10 HBSC protocol (Currie et al., 2010).

Dependent variables

Cannabis use was measured based on a series of questions asking respondents how often they had used cannabis in their lifetime, the last year, and the last month. In line with previous research that has examined differential patterns of

cannabis use and associated psychosocial adjustment (Shedler and Block, 1990), a variable that indicated the following patterns of cannabis use experiences was coded: 0 = *abstinence,* 1 = *experimental use* (defined as the use of cannabis 1–2 times in the last month or more than this but less than 10 times in their lifetime), 2 = *regular use* (defined as the use of cannabis 3 times in the last month or more than this and at least 10 times in their lifetime).

Student-level independent variables

Gender was entered as follows: 0 = female, 1 = male.

Family risk factors. Difficulties talking with parents was assessed with two items assessing ease of communication with mother and father separately. Because 29% of respondents did not live with two biological parents, the item indicating the greatest ease of talking with any parent was used and coded as follows: 1 = *very easy,* 2 = *easy,* 3 = *difficult,* 4 = *very difficult.*

School risk factors. School risk factors were measured through two separate variables. The first indicated low school satisfaction, assessed with an item inquiring how much the respondent likes school. Possible responses were 1 = *like a lot,* 2 = *like a bit,* 3 = *not very much,* and 4 = *not at all.* The second indicator was poor academic achievement, which was captured by an item asking the students to rate their perception of the teacher's appraisal of their performance relative to classmates. Possible responses were 1 = *very good,* 2 = *good,* 3 = *average,* and 4 = *below average.*

Risk behaviors. Bullying and fighting were measured based on two items that asked respondents how many times they had taken part in bullying another student(s) at school in the past couple of months and how many times during the last 12 months they had been in a physical fight. Because of its highly skewed distribution, respondents who reported *never* to both questions were coded as 0. Respondents who reported that they had been in a physical fight and/or taken part in bullying others were coded as 1.

Country-level independent variable

To create a measure indicating how common cannabis use is in the national youth population, a measure was used that asked adolescents on how many occasions they used cannabis during the past 30 days, with the following possible response categories: 0, 1–2, 3–5, 6–9, 10–19, 20–39, and 40 or more. This variable was re-coded to response category midpoints except from the last category (≥40), for which 45 occasions was used (40 times plus half the range to the midpoint of the adjunct category; Wicki et al., 2006). This led to the following categorization of the number of occasions on which cannabis was used: 0, 1.5, 4, 7.5, 14.5, 29.5, and 45. The variable was log transformed to approximate a normal distribution and to reduce the impact of extreme values (Tabachnick & Fidell, 2001). These individual-level data were then aggregated at the national level to create a measure of the national cannabis frequency prevalence rate.

Analytic strategy

To test our hypothesis that country-level cannabis use frequency moderates the strength of the relation between risk factors and experimental but not regular cannabis use at the individual level, we estimated a multinomial hierarchical linear model (HLM) with the dependent variable indicating the three different cannabis use experiences (0 = *abstinence,* 1 = *experimental use,* 2 = *regular use*). Abstinence was the reference category. For each of the levels of cannabis use, we tested the cross-level interactions between individual-level risk factors (Level 1) and country-level cannabis use frequency (Level 2). Because the Level 2 independent variable may overlap with the outcome variable, we ensured that the correlation between the two variables was low ($r = .22$, $p < .01$) and thus that we were not violating any model assumptions before running the HLM. Evidence for normalization is present if there is a significant negative interaction between Level 1 and Level 2 predictors at the same time as the corresponding Level 1 main effect is positive. This would mean that the individual-level risk factor in question is relatively weakly related to the level of cannabis use in question in high-frequency countries as compared with low-frequency countries.

To test the robustness of the results, sensitivity analyses with different thresholds for Level 1 cannabis use were conducted. Furthermore, to test whether results related to national cannabis frequency rates might be spurious, we ran the same model as described above with the only difference being that the outcome variable indicated individual-level alcohol and cigarette use experience instead of cannabis use.

Because of the cluster sampling of schools or school classes instead of individuals, which artificially enhanced test power by a factor of 1.2 to 1.6 (Kuntsche, 2004; Roberts et al., 2004), and the large sample size, the usual 5% α-error threshold was increased to 1% ($p < .01$) (Kuntsche et al., 2013). This was done to avoid reporting significant, albeit inconsequential, parameter estimates. The multinomial HLM was estimated using HLM Version 6.04 statistical software (Raudenbush et al., 2007).

Results

Table 1 describes the cross-national differences in abstinence and experimental and regular cannabis use. The abstinence prevalence rate across all countries was 82.4%, varying from 66.3% in Canada to 97.2% in Macedonia. The experimental cannabis use prevalence rate across all countries was 14.1%, varying from 2.1% in Macedonia to 26.8% in the Czech Republic. Regular cannabis use prevalence rate

TABLE 2. Multinomial hierarchical linear model predicting adolescent cannabis use across 31 countries

Variable	Coeff.	*SE*
Experimental cannabis use		
Male		
Intercept	1.03***	0.25
Cross-level interaction	-1.04***	0.23
Poor parental communication		
Intercept	0.01	0.19
Cross-level interaction	0.27	0.18
Low school satisfaction		
Intercept	0.43***	0.09
Cross-level interaction	-0.23**	0.08
Low academic achievement		
Intercept	0.34	0.20
Cross-level interaction	0.00	0.20
Bullying/fighting		
Intercept	1.58***	0.21
Cross-level interaction	-0.62***	0.21
Regular cannabis use		
Male		
Intercept	2.99***	0.27
Cross-level interaction	-2.58***	0.23
Poor parental communication		
Intercept	-0.13	0.30
Cross-level interaction	0.37	0.28
Low school satisfaction		
Intercept	0.78***	0.20
Cross-level interaction	-0.30	0.19
Low academic achievement		
Intercept	0.06	0.22
Cross-level interaction	0.46	0.20
Bullying/fighting		
Intercept	1.51***	0.37
Cross-level interaction	0.06	0.32
Individuals, *N*	60,499	
Countries, *N*	31	

Note: Coeff. = coefficient.
**$p < .01$; ***$p < .001$.

across all countries was 3.5%, varying from 0.4% in Armenia to 10% in Canada.

Results from the multinomial HLM are shown in Table 2. The upper part of the model examines normalization of experimental cannabis use. The results show significant and negative cross-level interactions for male, low school satisfaction, and bullying and fighting, whereas the intercepts for the corresponding individual-level risk factors are significant and positive. This indicates that in high-frequency countries, the individual-level risk factors of being male, reporting low school satisfaction, and participating in bullying and fighting are significantly weaker predictors of experimental cannabis use than in low cannabis frequency countries. For instance, between 87% and 95% of experimental users in the five lowest prevalence countries reported bullying and fighting, whereas in the five highest prevalence countries, adolescents who reported bullying and fighting constituted between 59% and 70% of all experimental users.

Other than the results directly pertaining to normalization, the main effects of the model show that poor parental communication and low academic achievement were not significant predictors. However, this should not be interpreted to mean that there was no association between these two predictors and experimental cannabis use. Indeed, when insignificant cross-level interactions were excluded from the HLM, both poor parental communication and low academic achievement significantly predicted experimental cannabis use (coefficient = 0.27, $p < .001$, coefficient = 0.34, $p < .001$, respectively; results not shown but are available on request).

For the part of the model examining regular cannabis use (Table 2, lower part), results show that only the risk factor of being male is moderated by national-level cannabis use frequency. More concretely, the results show that the intercept for boys is positive and significant, whereas the corresponding cross-level interaction is negative and significant. This means that although boys tend to be at greater risk than girls of using cannabis regularly, this gender difference is weaker in high than in low national frequency countries. Indeed, between 83% and 100% of frequent users in the five lowest prevalence countries were male, whereas in the five highest prevalence countries, males constituted between 79% and 89% of all frequent users.

Other than this finding, no evidence for cannabis normalization was found for regular cannabis use. However, results show that bullying and fighting and low school satisfaction significantly predict regular cannabis use regardless of national cannabis use frequency rates. Furthermore, when insignificant cross-level interactions were removed from the HLM, results showed that poor parental communication (coefficient = 0.25, $p < .001$) and low academic achievement (coefficient = 0.48, $p < .001$) also significantly predicted regular cannabis use (results not shown but are available on request).

Sensitivity analysis

Although the current definition of experimental and regular cannabis use is grounded in previous research examining the differences between different levels of cannabis use (Shedler & Block, 1990), we realize that the exact definition of each category is subject to debate. To test the robustness of the current results, sensitivity analyses with different thresholds for the cannabis use levels were conducted. First, the following categories were tried: 0 = *abstinence* (defined as no lifetime cannabis use experience), 2 = *experimental use* (defined as cannabis use one to two times in the last month), 3 = *regular use* (defined as cannabis use more than one to two times in the last month). Then the following categories were tried: 0 = *abstinence* (no lifetime cannabis use experience), 1 = *experimental use* (defined as cannabis use 1–2 times in the last month or less or 3 times or more in the last month but less than 20 times in their lifetime), 2 = *regular use* (defined as cannabis use 3 times in the last month or more and at least 20 times in their lifetime). Results from

the sensitivity analyses show similar patterns (results not shown but available from the first author on request) across the different thresholds, and we are thus confident that the results shown in the current article are robust.

The aggregate level of monthly cannabis frequency measure was chosen to represent how common cannabis use is in the national youth population because it is a measure of current levels of use as opposed to lifetime or last-year use, which may be less sensitive to current cannabis use trends in the youth culture. Furthermore, the frequency part of the measure was deemed important, as higher frequency levels at the national level are a proxy for how often youth may be exposed to use. Previous studies in the realm of drug use normalization have contended that one aspect of normalization is that young people are aware of the presence of drugs in their social worlds (Hirst & McCamley-Finney, 1994; Wibberley, 1997). Because it is expected that more frequent use will lead to more awareness among youth that cannabis use is taking place, the last-month cannabis use frequency measure was deemed appropriate to represent the level of cannabis normalization at the national level.

Nevertheless, we conducted sensitivity analyses with other national cannabis use prevalence rates to test the robustness of the results (e.g., the national aggregate of lifetime use and the frequency of lifetime use). The results show similar outcomes regardless of which country-level variables were used, increasing the confidence that the results presented in this article are robust (results not shown but are available from the first author on request).

Last, to test whether our results related to national cannabis frequency rates might be spurious, we ran the same model as presented in this article with the only difference being that the outcome variable indicated individual-level alcohol use instead of cannabis in one model and cigarette use instead of cannabis use in another model. If these additional models had shown similar results to those of the model presented in this article, it would indicate that national cannabis prevalence rates and corresponding interactions are indications of something other than cannabis use normalization specifically. The results for the additional models, however, did not show similar results (e.g., the only significant cross-level interaction for experimental users was for poor parental communication in the alcohol model; results not shown but are available from the first author on request). Thus, the sensitivity analysis strengthens the argument that the cross-level interactions measure cannabis normalization and not something more general in the youth culture pertinent to substance use and risk factors.

Discussion

The current study tests the underlying assumptions of the Normalization Theory in that it distinguishes between experimental and regular use of cannabis and tests whether the relationships between previously established cannabis use risk factors are weaker in high-frequency countries than in low-frequency countries. As expected, the current study finds more evidence for normalization of experimental cannabis use than regular cannabis use. More specifically, results show that adolescents who report experimental cannabis use and who live in relatively high cannabis frequency countries are less likely than their counterparts in low cannabis frequency countries to present some of the typical risk factors for cannabis use, such as male gender, low school satisfaction, and bullying and fighting. As such, the results partly resonate with Parker (2003) and others (Adlaf et al., 1994; Pape et al., 2008), who note that when prevalence rates are high, theories that tie substance use to social and behavioral risk factors need additional scrutiny and possibly adjustment.

The results presented in this article stand in contrast to a previous study (Sznitman et al., 2013) that examined the moderating role of cross-national prevalence rates in the relationship between adolescent risk factors and cannabis use. In this previous study, no evidence for normalization of cannabis use was found. The current study differs from the previous one in that it uses a more refined cannabis use measure by separating between experimental and regular use and finds evidence for normalization of the former but not the latter. As such, the current study highlights the importance of critically examining the measures used in drug research and considering whether different levels of use have meaningful and differential effects for analysis.

A nuanced cannabis use measure may be especially important for research that relates to the normalization debate, which is filled with controversy. Indeed, the normalization literature has been criticized for exaggerating how common drug use is through an overreliance on broad measures such as ever used or last-month use (Shiner & Newburn, 1997). Being sensitive to the fact that experimental use differs from regular use, and thus moving away from oversimplistic investigations of drug use normalization, the current study highlights that the different levels of cannabis use have different implications for the assumptions of the Normalization Theory. Although regular cannabis use may be part of young people's lives, it tends to occur in high-risk groups, even in countries where cannabis use is relatively common. This stands in contrast to experimental cannabis use, which in relatively high-frequency countries seems to occur in relatively low-risk adolescents.

Policy implications

The findings presented in this article highlight the importance of the social context in which youths live and suggest that this context may partly account for the relation between risk factors and adolescent cannabis use. This points toward important policy implications, particularly related to universal and targeted drug prevention efforts. Universal drug

prevention is aimed at the general youth population, whereas selective prevention targets individual adolescents with increased risk of cannabis use problems. A central question in drug prevention policy is whether limited resources are better directed toward universal or selective drug use prevention approaches.

The current study suggests that when it comes to the prevention of regular cannabis use, selective drug prevention is likely to be equally successful at reaching vulnerable youth in high- and low-frequency countries. Indeed, the current study suggests that regardless of national cannabis frequency rates, adolescents who use cannabis regularly are likely to fit the previously established typical risk profiles of cannabis use well. Thus, selective drug prevention programs that screen for risk factors when selecting people for interventions (Hawkins et al., 2002) are likely to successfully reach the critical mass of youth who use cannabis regularly regardless of how prevalent cannabis use is in the youth population.

In terms of experimental cannabis use, however, the present study suggests that universal drug prevention efforts may be the most important strategy in high-frequency countries, whereas selective prevention approaches may be the most important strategy in low-frequency countries. In low-frequency countries, experimental cannabis users fit established risk profiles. Therefore, selecting adolescents for interventions through the identification of risk factors is likely to successfully reach experimental cannabis users. In high-frequency countries, on the other hand, adolescents who experiment with cannabis are less likely to present typical risk factors; thus, selective prevention approaches are likely to miss identification of adolescents at risk for developing cannabis use problems. In these countries, a focus on universal drug prevention may be a more effective strategy.

Since the Normalization Theory literature partly grows out of observations of increasing substance use frequency rates among youth (Bachman et al., 1998; Currie et al., 2012; EMCDDA, 2008; Sandberg, 2013), recent studies suggest that in some European countries and in the United States there has been a reduction in cannabis use (Hibell et al., 2011; Johnston et al., 2011; Kuntsche et al., 2009). Clearly, adolescent cannabis use is a constantly changing phenomenon that presents particular challenges. From a research perspective, changing cannabis use patterns require constant monitoring, high-quality and up-to-date empirical research, and a constant reassessment of theories that can explain adolescent substance use. From a policy perspective, the changing patterns of adolescent substance use require constant reassessment of current policy practices and potential timely responses for effective action. Although the Normalization Theory was specifically developed to investigate the significance of high and increasing prevalence rates (Parker, 2003), it may not be particularly advantageous in understanding substance use in social contexts where cannabis use is decreasing. Clearly, although the Normalization Theory represents a novel and useful perspective, researchers may need to use a multitude of theoretical perspectives when investigating adolescent cannabis use and constantly revisit different perspectives in order to understand cannabis use among young people.

Limitations

This study is based on a large cross-national sample, which allowed testing the normalization of cannabis use across 31 countries. Despite the great advantage of these data, they also include limitations. Data are cross-sectional and based on representative samples from Europe, the Middle East, or North America, limiting causal inference and generalization to the rest of the world. Although the study's cross-sectional nature does not allow causal inference, the population's young age and short history of use suggest that any social variables found to be associated with cannabis use can reasonably be hypothesized to be preceding rather than caused by the cannabis use itself. However, research is needed that tests the Normalization Theory with longitudinal designs. Furthermore, self-reported cannabis use data can be influenced by memory or motivational biases; however, research has shown that youths' reports of drug use have high reliability and validity (Dolcini et al., 2003; Lintonen et al., 2004).

Because the HBSC is a school-based survey, it excludes school dropouts. Such losses vary by country but are moderate from a numerical point of view because most dropping out occurs after age 16 (European Union, 2013). Nevertheless, school dropouts are arguably the most seriously troubled adolescents and the most likely to use cannabis. Thus, school-based surveys are limited in their representation of the entire age cohort.

Another limitation is that the current study captures normalization by aggregate measures of adolescents' responses rather than by independent measures. Although an independent measure may have been preferred, the Normalization Theory is based on the premise that drug use culture and behavior is constantly changing and specific for particular age groups. Thus, independent measures of, for instance, adult national prevalence rates or cannabis use treatment data are not appropriate indicators of cannabis normalization, as these data are from different subpopulations that may not be experiencing cannabis normalization.

Conclusion

Cannabis use among adolescents is a constantly changing phenomenon, and despite implementation of different drug prevention strategies, adolescent cannabis use remains a serious public health concern (Kalant, 2004). It is therefore

crucial that research continues to examine different theoretical and analytic frameworks that can help researchers and policymakers understand the phenomena and that can inform novel and more effective prevention policies. The current study provides evidence for the normalization of experimental cannabis use in that adolescents who report experimental cannabis use and who live in relatively high cannabis frequency countries are less likely than their counterparts in low cannabis frequency countries to present some of the typical psychosocial and behavioral risk factors for cannabis use. However, limited evidence for normalization of regular cannabis use was found. Indeed, regular cannabis use tends to occur among high-risk adolescents to an equal degree in high and low cannabis frequency countries. Consequently, the Normalization Theory is validated as an informative framework for understanding the relation between the social context and individual-level cannabis use and, as such, provides a useful theoretical starting point to investigate and understand better contemporary patterns of adolescent cannabis use.

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