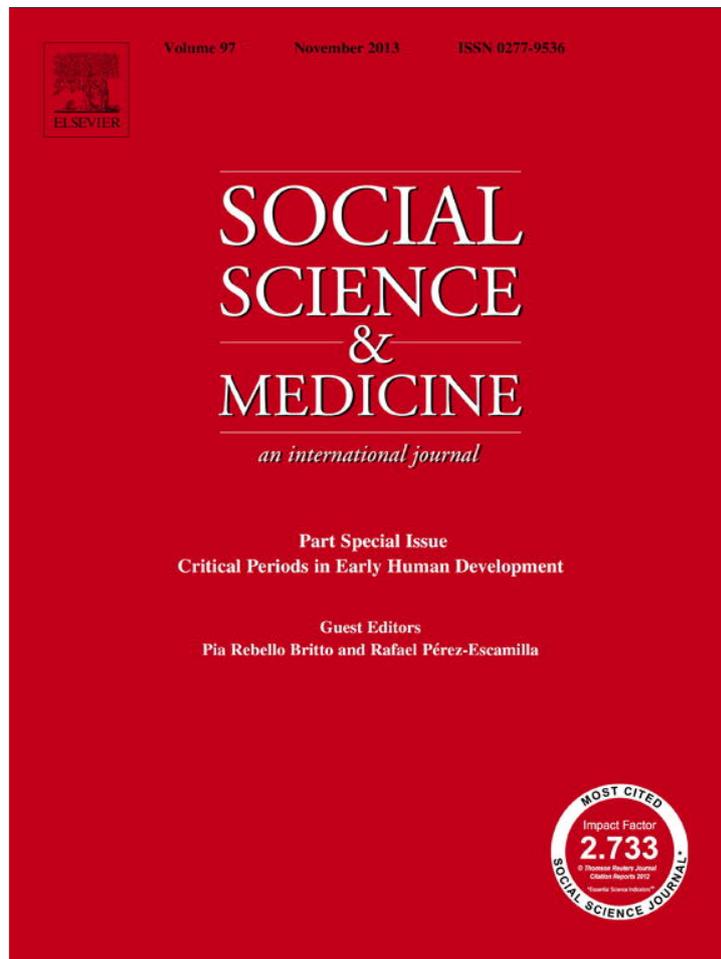


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Exploring substance use normalization among adolescents: A multilevel study in 35 countries



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ABSTRACT

The *substance use normalization thesis* predicts that adolescent substance users are less likely to report substance use risk factors in high than in low prevalence countries. This study tests whether national population-level alcohol, cigarette and cannabis prevalence rates moderate the strength of the relationship between individual level social and behavioral risk factors and individual level alcohol, cigarette and cannabis use. Data from 2009/2010 Health Behaviour in School-Aged Children Study ($N = 68,045$, age = 15) from 35 countries was analyzed using logistic Hierarchical Linear Modeling. As expected based on low cannabis prevalence rates in all countries studied, no evidence of normalization was found for recent cannabis use. Also in line with the normalization thesis, results show that for substance use that reaches above 40% in at least some of the countries studied (drunkenness, alcohol and cigarette use), adolescents who reported use are less likely to report social and behavioral risk factors in high prevalence countries than in low prevalence countries. However, support for the normalization thesis was only partial in that results show that in models where evidence for normalization was found, there are risk factors that predict substance use to an equal degree regardless of country level prevalence rates. The current research shows that the normalization thesis is a useful framework for understanding the contextual aspects of adolescent alcohol, tobacco, and cannabis use. The study has implications for drug prevention as it suggests that selective prevention efforts may be particularly useful in low prevalence countries where screening based on risk factors may usefully identify adolescents at most risk for developing drug use problems. This approach may be less useful in high prevalence countries where screening based on risk factors is less likely to satisfactorily identify those at risk for developing drug use problems.

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Introduction

Adolescent substance use, including alcohol, cigarette and cannabis use, is widespread and has been linked to adverse

consequences such as unintentional injuries (Boden & Fergusson, 2011), early initiation of sexual intercourse (Paul, Fitzjohn, Herbison, & Dickson, 2000), anti-social behavior (Jessor, Donovan, & Costa, 1991) adult substance use disorders (D'Amico, Ellickson, Collins, Martino, & Klein, 2005) and other health problems (Aldington et al., 2008; Chassin, Presson, Sherman, & Edwards, 1990). A comprehensive understanding of contemporary patterns and risk factors of adolescent substance use is important to the advancement of the scientific field and critical for the development of effective prevention efforts.

Although the propensity for substance use may in part be rooted in biological and genetic factors (Conrod, Pihl, Stewart, & Dongier, 2000; Ersche et al., 2012; Labouvie & McGee, 1986; Milich et al.,

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2000; Pihl & Peterson, 1995) and emotional or mood disorders (Fergusson, Horwood, & Swain-Campbell, 2002; Kandel & Chen, 2000; Rey, Sawyer, Raphael, Patton, & Lynskey, 2002), adolescent substance use patterns develop in multilevel social contexts ranging from interpersonal relationships to societal-level structural constraints (e.g. cultural norms). Indeed, a long research tradition in adolescent substance use is based in risk focused approaches and this line of research has identified various social-psychological risk factors for adolescents substance use (Hawkins, Catalano, & Miller, 1992). These can be classified into two broad domains. First, the risk environment domain highlights poor relationship with parents and school as important risk factors for adolescent substance use. Second, the risk behavioral domain notes that adolescent substance use is related to a general proneness to problem behavior and thus related to additional anti-social conduct (Jessor et al., 1991).²

In contrast to risk focused research, there is a small, albeit growing research literature that theorizes adolescent substance use as being a potentially “normative behavior”. In particular, Parker, Aldrige, and Measham (1998) use the term “drug use normalization” to describe data that indicate that drug use in the UK is a widespread and socially accepted activity, rather than a deviant one.

Parker's normalization thesis, and the researchers inspired by this pioneering work, develop and discuss various concepts that are not always systematically and empirically tested (Sznitman, 2007, 2009). The present study set out to develop further and empirically test the substance use normalization thesis by integrating elements from “normalization” and “risk focused” frameworks. This is achieved by first laying out key elements and findings from risk focused substance use research. The paper then discusses the normalization literature, its gaps and how the theoretical perspective can be developed further by integrating elements from the risk focused research. This is followed by a description of the data and analytical approaches used to test the normalization thesis in the current study and then a presentation of results and a discussion of the results in light of policy implications. Indeed, by developing the normalization thesis further, the current study aims to reach a better understanding of contemporary patterns of adolescent alcohol and other substance use, which in turn, promises to generate important information for policymakers.

Risk focused adolescent substance use research

In much research and theory, adolescent substance use is explained as a function of risk factors. Within this research tradition adolescent substance use is primarily understood in terms of deviance or some kind of maladjustment to conventional society. Problem Behavior Theory (PBT) (Jessor & Jessor, 1977) hypothesizes that adolescent alcohol and other substance use, multiple sexual partners and minor delinquency are all related to an individual's general “proneness” to problem behaviors which is assumed to be a reflection of common interpersonal and environmental risk factors which increase the risk of problem behaviors (Donovan, Jessor, & Costa, 1991; Lynskey, 2001). As such PBT suggests that substance use is closely related to additional problematic risk behaviors and representative of youth at risk.

² While it could be argued that part of the societal-level structural constraint comprise of different drug policies and laws, it has been posited that laws often reflect social norms and that use is largely a function of group norms (Watts & Rabow, 1983). Furthermore, studies seem to agree that there is no systematic relation between drug laws and drug behavior (Reuband, 1998; Single, Christie, & Ali, 2000). While the current study does not explicitly examine the influence of alcohol and drug laws, it does focus on norms in that the national prevalence rates of substance use is considered. As such, part of the effect of national prevalence rates may in fact be a proxy for national drug regulation.

Similarly, Social Control Theory (SCT) (Hirschi, 1969) explains substance use as a function of weak conventional bonds to family and school. SCT is based on the idea that all people have deviant impulses that can lead to deviant behavior such as substance use. However, acting on these impulses typically only occurs when there is a lack of social control caused by weak social bonds to school and family.

Social Development Model (SDM) (Hawkins & Weis, 1985) pays particular attention to academic achievement as a contributor to social risk environments. SDM assumes that adolescents are particularly likely to use substances if they have few academic skills for rewarding interactions at school and receive little reinforcement during their interactions with parents and teachers (Petraitis & Flay, 1995).

Although the different theoretical underpinnings of risk focused research diverge in many respects, they share the underlying assumption that substance use is likely to be associated with other problem behaviors and that much of this association arise from common school and family risk factors (Gottfredson & Hirschi, 1990; Hirschi, 1969; Jessor & Jessor, 1977). Risk focused research has provided evidence for a range of social-psychological and behavioral risk factors for adolescent alcohol and other substance use, including fighting and bullying (Kuntsche et al., 2004; Lynskey, 2001; Molcho, Harel, & Lash, 2004; Nansel et al., 2001), low academic achievement (Macleod et al., 2004; Ravens-Sieberer, Kokonyei, & Thomas, 2004), poor relationship with school (Bonny, Britto, Klostermann, Hornung, & Slap, 2000; Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Henry & Slater, 2007; Samdal, 2000; Sznitman, Dunlop, Nalkur, Khurana, & Romer, 2012) and parents (Kokkevi, Fotiou, Arapaki, & Richardson, 2008; Petraitis & Flay, 1995; Springer, Parcel, Baumler, & Ross, 2006), peer (Mercken, Snijders, Steglich, Vartiainen, & de Vries, 2010, 2012; Pearson & Michell, 2000; Sznitman, 2013), sibling and parental substance use (Fagan & Najman, 2005; Windle, 2000) and drug use attitudes and risk perceptions (Hibell et al., 2011; Johnston, O'Malley, Bachman, & Schulenberg, 2011)

Substance use normalization research

An alternative strand of research has questioned the usefulness of always theorizing adolescent alcohol and other substance use as closely connected with risk and problem behavior. Moffitt (1993) conceptualized adolescent substance use experimentation as normative because it enables adolescents to project a desirable adult image. Also, recent research shows that moderate substance use among adolescents provides opportunities to intensify and initiate contacts with peers that may be related to peer relations in a positive sense (Engels & ter Bogt, 2001).

Similarly, Parker has used the term “substance use normalization” to describe widespread alcohol and other substance use among “well-adjusted and successful goal oriented, non-risk taking young persons” (Parker, 1997 p.25). This echoes findings by Shedler and Block (1990) who found that adolescents who experimented with drugs were better adjusted than abstainers and heavy drug users.

The original normalization literature which characterized substance users in the UK as well-adjusted and low risk was placed in the context of increasing and exceptionally high substance use prevalence rates. As such, the normalization thesis suggests that high substance use prevalence rates is associated with a shift in the recruitment of substance users from risky, deviant segments to non-risky, well adjusted segments of the youth population. However, this is not empirically tested and put forward as evidence for normalization. Instead, the evidence provided by Parker et al. (1998) that normalization has occurred in the U.K. are twofold:

statistical data showing large numbers of young people who report drug use, and changes in culture, identified as being more accepting of substance use.

Only a few studies have empirically tested the normalization thesis in terms of its premise that high prevalence rates are connected with drug taking by well-adjusted, non-risk taking youth. Three of these studies have failed to find evidence for normalization in that time periods with high population substance use were not associated with relatively low delinquency among substance users as compared to time periods with low population level substance use (Adlaf, Smart, Walsh, & Ivis, 1994; Little, Weaver, King, Liu, & Chassin, 2008; Pape & Storrø, 2007).

Other studies have found support for the normalization thesis. A Norwegian study (Pape, Rossow, & Storrø, 2008) found that when drunkenness was relatively common among youth, its association with deviant behavior was weaker than when drunkenness was less prominent. In the only study that compared different countries (Sznitman, 2007) results showed that cannabis users were more likely to be involved in delinquency in the low prevalence country studied (Sweden) than in the high prevalence country (Switzerland). However, cannabis users in Switzerland were not more bonded to parents and school than their counterparts in Sweden.

The current study

The objective of the present study is to develop further and empirically test the substance use normalization thesis by integrating elements from the original normalization and risk-focused research. As mentioned, very few studies have examined the normalization thesis in terms of the systematic relationship between prevalence rates and the risk profiles of users. Furthermore, and except from one study (Sznitman, 2007), the few studies that have examined this relation are limited as they focus solely on risk behaviors while social and family risk factors are neglected (see Adlaf et al., 1994; Little et al., 2008; Pape et al., 2008; Pape & Storrø, 2007).

One reason for the lack of studies in this area of research may be the paucity of suitable data. Indeed, an examination of the systematic relationship between national prevalence rates and risk profiles of adolescent substance users requires comparative cross national data from many countries, which is rare. In this study, data from the Health Behaviour in School-aged Children (HBSC) World Health Organization was used which offers an exceptional opportunity to explore the substance use normalization theory because it gathers comparative health behavior data from adolescents across 43 countries/regions, using the same mandatory questionnaire, and thus enables a comparison of adolescents risk profiles across different levels of national substance use prevalence rates.

By following the logic of risk focused research it can be inferred that substance use among adolescents can be predicted based on family, school and behavioral risk factors. Combining this logic with the normalization thesis we hypothesize that when a substantial proportion of adolescents use substances, social-psychological and behavioral risk factors are weaker predictors of substance use than when adolescent substance use is uncommon. This hypothesis is in line with the normalization thesis which postulate that high substance use prevalence rates indicate that substance use have entered mainstream youth culture and does thus attract well adjusted, low risk youth.

Although the threshold for what constitute “high substance use prevalence rates” and thus normalization is unclear (Erickson & Hathaway, 2010), population prevalence rates above 40% have previously been interpreted as evidence for substance use normalization (Duff, 2005; Lenton, Boys, & Norcross, 1997; Parker

et al., 1998; Sznitman, 2007). In line with this, support for this study's hypothesis comprise evidence that show that when national prevalence rates reach 40% in some countries, there is a smaller difference between substance users and non users in terms of school, family and behavioral risk factors in high prevalence countries as compared to in low prevalence countries. In contrast, for substances that are relatively uncommon (<40% prevalence rates in all countries included in the analyzes), no such evidence for normalization is expected.

Methods

Data and participants

Data are from the 2009/2010 HBSC study in which 43 countries/regions participated. The study gathers data in representative samples of 11, 13 and 15 year olds. The primary sampling unit is the school class or whole school where sample frame of classes is unavailable. A random sample is selected, with some countries stratifying by region, school type or geography, and others selecting a simple random sample. HBSC data is collected through the use of anonymous self-report questionnaires 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).

A total of 207,334 adolescents took part in the 2009/2010 survey. Response rates for schools were above 70% in most countries (Currie et al., 2012). Additional data collection information is available elsewhere (Currie et al., 2012). Of the 43 countries/regions taking part in the survey, the current analyzes include data from 35 countries due to missing data on dependent variables (see Table 1 for details).

Since the normalization thesis is based on the existence of high alcohol and other substance use prevalence rates, the current analyzes excluded 11 and 13 year olds among which substance use prevalence rates are rather low (Currie et al., 2012). This provided a sample of 69,805 15-year olds (50.5% female, see Table 1 for a detailed overview).

Dependent variables

Last month alcohol use and *drunkenness*, *cigarette* and *cannabis use* were measured based on separate items that asked respondents on how many occasions they had drunk alcohol, been drunk, smoked cigarettes and used cannabis in the last 30 days. Responses were coded as 0 = never, 1 = once or more. All substance use measures have been validated for international use (Currie et al., 2012).

Student-level independent variables

Respondent's gender was entered in all models (0 = female, 1 = male).

Family risk factors

According to SCT poor parental communication is a substance use risk factor because it weakens attachment to parents and psychological parental presence and thus parental control of adolescents' behavior. Previous studies have shown that communication with family members is highly correlated with several measures of attachment to parents (Currie, Hurrelmann, Settertobulte, Smith, & Todd, 2000). *Difficulties talking with parents* was assessed with two items querying ease of communication with mother and separately, with father, coded on a four-point Likert scale. Consistent with previous HBSC research (Gage,

Overpeck, Nansel, & Kogan, 2005; Spriggs, Iannotti, Nansel, & Haynie, 2007), and 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 possible responses were 1 = very easy, 2 = easy, 3 = difficult, 4 = very difficult.

School risk factors

According to SCT, adolescents with low school satisfaction are at risk for substance use because they are unlikely to internalize values and standards of conventional behavior and thus to be controlled by them. In the current study *low school satisfaction* was 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 or 4 = not at all. Test–retest reliability has been found to be moderate yet within an acceptable level of stability (Torsheim, Wold, Samdal, & Haugland, 1997).

According to SDM poor academic achievement is a substance use risk factor because it leads to fewer rewarding interactions at school and thus little positive reinforcement during interactions with parents and teachers. In turn, SDM notes, poor achievers are less attached to schools and parents which in turn increases substance use risk. In the current study *poor academic achievement* was captured by an item asking the student to rate his/hers perception of the teacher's appraisal of their performance relative to classmates. Possible responses were 1 = very good, 2 = good, 3 = average, or 4 = below average. While grades and test scores constitute more objective measures of students' school performance, such measures were not available in the HBS dataset. However, previous studies have shown that students often perceive themselves to be competent when they perform well (Reeve, 2002) and students' perceptions of their academic competence are usually moderately correlated with grades and test scores (Alsaker & Kroger, 2006). Test–retest stability of the employed measure has been found to be acceptable (Torsheim et al., 1997).

Risk behavior

According to PBT bullying perpetration and participating in physical fighting are strongly related to substance use because these are all indications of a “general proneness” to problem behaviors. Bullying and fighting has been shown to be highly correlated in previous research (Craig & Harel, 2004; Nansel, Overpeck, Haynie, Ruan, & Scheidt, 2003). In the current study, bullying perpetration and fighting was measured based on two items that asked respondents how many times during the last 12 months they had been in a physical fight and how many times they had taken part in bullying another student(s) at school in the past couple of months. Due to 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 were coded as 1.

Country level independent variables

National prevalence rates of last month drunkenness, alcohol, cigarette and cannabis use were created by aggregating students' data at the country level.

Analytic strategy

To test our hypothesis that country level substance use prevalence rates moderates the strength of the relation between risk factors and substance use at the individual level, we estimated four different Hierarchical Linear Models (HLM) with Bernoulli distribution log-link functions for each of the dichotomous dependent variables (last month drunkenness, alcohol, cigarette

and cannabis use). In each model we tested the cross level interactions between individual level risk factors (level 1) and country level substance use prevalence rates (level 2). 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 risk factor in question is relatively weakly related to substance use in high prevalence countries as compared to in low prevalence countries. Interactions that were not significant ($p < 0.05$) were excluded from the final models, while leaving all main effects. HLM models were estimated using HLM version 6.04 statistical software (Tabachnick & Fidell, 2001). See Appendix 1 for HLM formula and Appendix 2 for full models including non-significant interactions.

Since multilevel modeling with cross-level interactions was used as statistical analysis, standard procedures to account for complex survey design becomes overly complicated and may lead to non-convergence of models. Thus, and instead of using standard procedures to avoid overestimation of the significance of the relations among variables due to the fact that the sample was a cluster rather than a random sample (Roberts, Tynjälä, Currie, & King, 2004), we used a conservative design factor of 1.6 to down weight the data (Kuntsche, 2004).

Results

Table 1 describes the cross national differences in the four substance use variables examined in this study. Last month prevalence of alcohol use across all countries was 53.8%, varying from 27.0% in Iceland to 73.6% in Denmark. Last month prevalence of drunkenness across all countries was 24.3%, varying from 11.5% in Portugal to 52.7% in Denmark. In terms of last month cigarette use the prevalence rate across all countries was 26.8%, varying from 9.7% in Armenia to 43.4% in Latvia. Last month cannabis use prevalence rate across all countries was 8.1%, varying from 1.8% in Macedonia to 18.2% in Canada.

Results from the four separate HLM models are shown in Table 2. For last month alcohol use (Table 2, model 1), support for normalization was found for low academic achievement and bullying and fighting. In other words, in countries with relatively high last month alcohol prevalence rates, the positive relations between these individual risk factors and last month alcohol use are weaker than in low prevalence countries.

In terms of last month drunkenness (model 2 in Table 2), evidence for normalization was found for male, difficulties talking with parents and fighting and bullying; in countries with relatively high drunkenness prevalence rates, the positive relations between drunkenness and being male, drunkenness and difficulties talking with parents and drunkenness and having been in fights and bullied others are weaker than in countries with relatively low drunkenness prevalence rates.

Model 3 shows the results for the HLM model predicting last month cigarette use. Results show evidence for normalization in terms of difficulties talking with parents and bullying and fighting. In other words, results indicate that last month cigarette use is relatively weakly related to difficulties talking with parents and fighting and bullying in countries with high cigarette use prevalence rates when compared to low prevalence countries.

In the model predicting last month cannabis use (Table 2, Model 4) evidence for normalization is only evident for gender; in high prevalence countries, the individual level risk factors of being male is a weaker predictor of recent cannabis use as compared to in low prevalence countries. However, the OR for the cross level interaction is exceptionally small (OR = 0.003) indicating a significant, albeit inconsequential effect.

Table 1
Sample sizes, prevalence of last month alcohol use, drunkenness, cigarette and cannabis use in each country.

Countries (alphabetic order)	Sample size	Last month alcohol use	Last month drunkenness	Last month cigarette use	Last month cannabis use
Austria	1820	65.72%	30.26%	38.62%	6.11%
Armenia	915	38.26%	11.81%	9.70%	2.55%
Belgium	2567	63.75%	22.68%	26.94%	10.34%
Canada	5441	41.23%	24.77%	16.85%	18.15%
Croatia	2424	65.16%	24.44%	38.11%	5.46%
Czech Republic	1522	73.52%	32.72%	NA	10.88%
Denmark	1226	73.56%	52.66%	25.87%	3.87%
Estonia	1398	58.80%	27.10%	30.48%	3.68%
Finland	2110	49.58%	34.05%	35.31%	4.41%
France	1906	60.54%	17.16%	33.78%	14.20%
Germany	1640	62.98%	20.65%	25.71%	3.69%
Greece	1648	70.63%	16.22%	26.02%	4.02%
Greenland	397	NA	NA	NA	4.48%
Hungary	1733	61.40%	24.65%	37.15%	5.69%
Iceland	3680	26.95%	17.50%	15.82%	3.57%
Ireland	1695	44.74%	26.44%	22.92%	8.10%
Israel	1352	29.11%	14.53%	16.18%	5.53%
Italy	1546	NA	NA	NA	10.46%
Latvia	1375	69.22%	32.15%	43.41%	8.81%
Lithuania	1792	62.75%	35.30%	41.43%	5.51%
Luxembourg	1382	53.33%	15.05%	32.06%	8.54%
Netherlands	1457	58.90%	15.22%	26.42%	9.16%
Norway	1339	38.01%	19.27%	17.64%	2.25%
Poland	1410	49.96%	17.67%	28.32%	7.69%
Portugal	1553	50.91%	11.50%	19.38%	5.28%
Romania	2002	53.39%	22.75%	31.24%	3.12%
Slovakia	1914	55.07%	21.47%	31.93%	5.51%
Slovenia	1815	66.43%	28.53%	29.95%	9.96%
Spain	2003	56.97%	25.48%	29.70%	16.01%
Sweden	2090	39.53%	21.31%	25.51%	NA
Switzerland	2246	54.87%	18.84%	29.23%	13.80%
Ukraine	1897	60.42%	19.99%	31.23%	2.55%
Macedonia	1536	44.59%	15.40%	22.06%	1.78%
United Kingdom	5322	62.49%	37.21%	22.70%	8.90%
USA	1892	38.08%	22.89%	18.08%	14.49%
Total	68,045	53.80%	24.28%	26.80%	8.10%

Note: data is based on 2009/2010 Health Behaviour in School Aged Children data. Abbreviation: NA, not available.

In addition to the evidence found for normalization, the results also show that in all instances where there were no significant cross-level interactions, the individual level risk factors, except from being male, significantly predicted substance use.

Table 2
HLM models predicting adolescent substance use.

Individual level	Country level	Model 1 last month alcohol use		Model 2 last month drunkenness		Model 3 last month cigarette use		Model 4 last month cannabis use	
		OR	CI	OR	CI	OR	CI	OR	CI
Male	Intercept	0.80	(0.72,0.88)**	1.40	(1.01,1.93)*	0.71	(0.64,0.80)**	2.21	(1.82,2.68)**
	Cross-level interaction			0.15	(0.05,0.43)**			0.003	(0.00,0.01)**
Difficulties talking to parent	Intercept	1.10	(1.07,1.13)**	1.19	(1.08,1.32)**	1.29	(1.17,1.42)**	1.16	(1.11,1.20)**
	Cross-level interaction			0.70	(0.49,0.99)*	0.63	(0.46,0.86)**		
Low school satisfaction	Intercept	1.23	(1.18,1.28)**	1.28	(1.25,1.32)**	1.29	(1.23,1.45)**	1.37	(1.30,1.45)**
	Cross-level interaction								
Low academic achievement	Intercept	1.54	(1.31,1.81)**	1.34	(1.29,1.39)**	1.54	(1.48,1.61)**	1.47	(1.40,1.55)**
	Cross-level interaction	0.65	(0.49,0.86)**						
Bullying/fighting	Intercept	3.59	(2.83,4.56)**	3.12	(2.55,3.83)**	3.83	(3.07,4.88)**	3.16	(2.80,3.57)**
	Cross-level interaction	0.43	(0.27,0.69)**	0.54	(0.27,1.09)*	0.36	(0.16,0.83)*		
Chi-square^a		29,630.03**		28,378.14**		29,977.66**		19,792.79**	
Df		8		9		10		7	
N: individuals		67,949		67,949		64,580		65,955	
N: countries		34		34		32		34	

* $p < 0.05$, ** $p < 0.01$.

Note: data is based on 2009/2010 Health Behaviour in School Aged Children data, CI: Confidence Intervals, OR: Odds Ratio.

^a Comparison to null-model, Laplace full likelihood function.

Results from models 1 and 3 also show that when holding constant all other risk factors, females are more likely to drink and smoke than their male counterparts. This is a surprising finding as it is often expected that females are equally (Kokkevi, Richardson, Florescu, Kuzman, & Stergar, 2007) or less likely than males to use substances, although this gender gap has been found to be shrinking (Kuntsche et al., 2011). It needs to be noted that across all countries males and females were equally likely to drink (55% vs. 53%, $p = 0.07$) and smoke (26% vs. 26%, $p = 0.20$). The result that females drink and smoke more than males net of other risk factors is thus likely due to the fact that the risk factors included in the models account for more of the variation in male than female substance use. Particularly, fighting and bullying are predominantly male risk behaviors with 62% of males and 38% of females reporting fighting and bullying in the current study. Fighting and bullying is also more common among male than among female drinkers (72% of male and 46% female drinkers reported fighting and bullying) and among male than among female smokers (80% of male and 58% of smokers reported fighting and bullying).

Since bullying and fighting is a particularly strong predictor of both drinking and smoking, and because the predictor accounts for more of the variation in male than female drinking and smoking, what remains is a negative OR for the male variable.

Discussion

The current study develops further the substance use normalization thesis coined by Parker et al. (1998) by testing whether the relationship between previously established risk factors and alcohol, tobacco, and cannabis use is weaker in high prevalence than in low prevalence countries. Based on previous studies which have used population prevalence rates of 40% and above as indicators for drug use normalization (Duff, 2005; Lenton et al., 1997; Parker et al., 1998; Sznitman, 2007), evidence for normalization in this study should be evident for last month alcohol and cigarette use and drunkenness (highest national prevalence rates reach 74%, 53% and 43% respectively). Since recent cannabis use prevalence rates across all countries are relatively low (highest national prevalence rates reached 18% and just eight of the 35 counties had prevalence rates of past-month cannabis use greater than 10%; Belgium, Canada, the Czech Republic, France, Italy, Spain,

Switzerland, and the USA), we would not expect to find evidence of normalization for this dependent variable.

Results of the current study provide evidence in support for the normalization thesis and establish that last month alcohol and cigarette use and drunkenness, but not last month cannabis use, can be considered to be at least partly normalized in some countries. Indeed, in all models where some national prevalence rates reach above 40%, evidence in line with the normalization thesis was found. More specifically, results show that adolescents who report recent alcohol and cigarette use, drunkenness and who live in relatively high prevalence countries, are less likely than their counterparts in low prevalence countries to present some of the typical risk factors for substance use. As such, our results resonate with Parker et al. (2003) and others (Adlaf et al., 1994; Pape et al., 2008), who have implied that when prevalence rates are high, theories that link alcohol, tobacco, and cannabis use to social and behavioral risk factors need further examination and possibly modification.

In further support for the normalization thesis, our results show that when predicting last month cannabis use, which based on prevalence rates is the least normalized form of substance use measured, only gender was modified by country level recent cannabis use and the moderation effect was exceptionally small. Thus, and as expected, there was no firm evidence of normalization for this low prevalence substance use measure. Combined with the evidence found for normalization for more normative substance use measures, this result provides evidence in line with the normalization thesis that there is a systematic relationship between high national prevalence rates and the strength of relationship between common risk factors and substance use at the individual level.

Hitherto, normalization studies have most commonly examined the relation between substance use and delinquency proneness (Adlaf et al., 1994; Pape et al., 2008), rather than other risk factors. The current study bears strength as it expands the measure of normalization to also include school and family risk factors. However, the results are more complex in terms of these extra risk factors than they are for bullying and fighting. Indeed, while fighting and bullying was moderated by population level substance use across all models (except last month cannabis use, for which normalization has not occurred as discussed above), family and school risk factors were inconsistently moderated by national level substance use across models. For instance, while low academic achievement was moderated as a risk factor for last month alcohol use by aggregated level use, this was not true in the other substance use models. Similarly, while difficulties talking with parents was moderated as a risk factor for last month drunkenness and cigarette use by aggregated level prevalence rates, this was not true for the other models.

The reason why family and school risk factors were more inconsistent predictors of normalization than bullying and fighting may be that the influence of the family and school risk factors on adolescent alcohol, tobacco, and cannabis use is dependent on unmeasured external factors. For instance, the substance use risk attributed to parental communication, school satisfaction and achievement may depend on environmental influences such as neighborhood SES, contextual effect of the school environment, classmate support and problems (Henry & Slater, 2007; LaRusso, Romer, & Selman, 2008). Since we were unable to control for these potentially interfering factors, the effect of all indicators other than bullying and fighting may also be particularly difficult to detect.

Limitations

A strength of this study is the large cross national sample, which allowed testing of the normalization of alcohol, cigarette and cannabis use across 35 countries. However, data were collected from cross-sectional samples and all countries are located in

Europe or North America, limiting causal inference and generalization. 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 alcohol, cigarette and cannabis use can reasonably be hypothesized to be primary rather than secondary resulting from the use itself. However, future research should test the normalization thesis with longitudinal designs. Furthermore, self-reported substance use data can be influenced by memory or motivational biases; however research has shown that youth's reports of drug use have high reliability and validity (Dolcini, Adler, Lee, & Bauman, 2003; Lintonen, Ahlström, & Metso, 2004).

Another limitation of the current study is its limited scope. Substance use is driven by a host of genetic, bio-chemical, (Conrod et al., 2000; Ersche et al., 2012; Labouvie & McGee, 1986; Milich et al., 2000) personality (Fergusson et al., 2002; Kandel & Chen, 2000; Rey et al., 2002) and social factors and it is difficult to appropriately address all of these in one model. This study focuses on important social-psychosocial factors but future research on drug use normalization should include genetic, bio-chemical and personality factors that were beyond the scope of the current study. Furthermore, and in addition to the independent social-psychosocial substance use risk factors measured here, risk focused research has also established that peer (Pearson & Michell, 2000; Sznitman, 2013), sibling and parental (Fagan & Najman, 2005; Windle, 2000) substance use as well as substance use attitudes and risk perceptions (Hibell et al., 2011; Johnston et al., 2011) are important risk factors for adolescent substance use. Data to measure these additional social-psychosocial risk factors were, however, not available in the HBSC dataset and are thus not included in the current study. Finally, while the current study focuses on current use, normalization is also relevant to substance use experimentation which may be better captured by lifetime measures. An examination of different levels of substance use and normalization was beyond the scope of the current study, but this should be examined in future studies.

Policy implications

Since the current study is one of the first to systematically test the relation between national prevalence rates and a broad range of individual level risk factors for substance use, caution should be exercised in translating the results into policy implications. Nevertheless, the current results point toward potential policy inferences of the normalization thesis that are important to point out.

Adolescent substance use prevention often takes on universal or selective properties. Universal drug prevention programs target all adolescents while selective substance use prevention target individuals whose risk of developing alcohol, tobacco, and cannabis use problems has been identified as significantly higher than the average (Burkhart, 2008). This latter approach is based on risk-focused research that has established that adolescents who are prone to substance use are also likely to represent other risk factors such as weak bonds to family and school and being more prone to defy social norms and participate in other risky behavior. Selective prevention is based on the promise that identifying and addressing these risk factors is a critical step in the prevention of substance use problems (Hawkins & Catalano, 2002).

A critical question in drug prevention policy is whether risk factors are equally important for predicting and preventing substance use problems across different countries and whether scarce resources are better placed on universal or selective drug use prevention efforts. The current results suggest that while both universal and selective approaches are needed in all countries, universal drug prevention efforts may be the most important

strategy in high prevalence countries whereas selective prevention approaches may be the most important strategy in low prevalence countries. Indeed, the current study shows that in low prevalence countries, adolescent substance users are likely to fit the previously established typical risk profiles well. Thus, in low prevalence countries, selective drug prevention programs that screen for risk factors when selecting people for interventions (Hawkins & Catalano, 2002) are likely to successfully reach the critical mass of youth at risk for developing substance use problems.

In high prevalence countries, on the other hand, there is a relatively weak link between socio-psychological and behavioral risk factors and substance use. Focusing solely on risk factors for selective prevention programs may thus miss a critical proportion of adolescents at risk for developing substance use problems. Instead, a focus on universal drug prevention, that for instance attempt to reduce youth's social approval of substance use in general, may be a particularly useful strategy in high prevalence countries.

Another implication for drug prevention in high prevalence countries relates to the risk factor-informed prototype that is sometimes evident in the depiction of substance users in public health campaigns (DeJong & Wallack, 1999). Research related to consumer preference (Niedenthal, Cantor, & Kihlstrom, 1985) and educational choices (Hannover & Kessels, 2004) has found that congruence between a prototype and a person's self view is associated with behavior consistent with that of the prototype. These studies suggest that in high prevalence countries in particular, campaigns that portray substance users with stereotypical risk profiles decrease the likelihood that adolescents will identify with the prototypes because adolescent substance users do not fit the expected risk profile. Future research should investigate whether national drug prevention efforts with and without a risk-focus has differential effect depending on the national prevalence rates of adolescent substance use.

Conclusion

The work of Rose and Day (1990) and the related total consumption model (Kendell, 1984) point out that the proportion of the population with substance use problems is a function of average use in the population. In light of this, widespread adolescent substance use as evident in many countries examined in this study is of particular concern. Indeed, despite widespread implementation of different drug prevention strategies, adolescent alcohol, tobacco, and cannabis use continue to be a public health concern in European and North American countries (Hibell et al., 2011; Johnston et al., 2011). It is crucial that research continues to examine different theoretical and analytic frameworks that can help researchers and policymakers understand the phenomena and which can inform prevention policies and research. The current research provides evidence that the normalization thesis is a useful and informative framework for understanding contemporary patterns in adolescent alcohol, tobacco, and cannabis use. The framework has implications for drug prevention policies as results suggest that universal drug prevention efforts may be particularly useful in high prevalence countries, whereas selective prevention efforts may be particularly useful in low prevalence countries.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.socscimed.2013.08.038>.

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