Addictive Behaviors Reports 2 (2015) 6–12

Contents lists available at ScienceDirect

Addictive Behaviors Reports

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

Daily tobacco smoking, heavy alcohol use, and hashish use among adolescents in southern Sweden: A population-based multilevel study

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ARTICLE INFO

Article history:
Received 20 January 2015
Received in revised form 23 March 2015
Accepted 24 March 2015
Available online 28 March 2015

Keywords:
Tobacco smoking
Alcohol use
Hashish use
Multilevel analysis
Sweden

ABSTRACT

Introduction: The aim of this study was to investigate school contextual effects on daily tobacco smoking, heavy alcohol use and hashish use among adolescents, using multilevel analyses adjusting for individual-level factors.
Methods: The 2012 public health survey among adolescents in Skåne includes pupils in ninth grade in primary school (predominantly 15–16 years old) and second grade in secondary school (gymnasium) (predominantly 17–18 years old). Multilevel logistic regressions were performed.
Results: The prevalence of all three behaviors was higher in the second grade in the gymnasium. Several sociodemographic, psychosocial and parental factors were associated with these behaviors. In the ninth grade, variance partition coefficients (VPCs) for tobacco smoking decreased from 10.2% in the empty model to 1.9% in the fully adjusted model, for heavy alcohol use from 6.5% to 6.3%, while VPCs for hashish increased from 9.9% to 11.0%. In the second grade, VPCs for daily tobacco smoking decreased from 13.6% in the empty model to 6.5% in the fully adjusted model, VPCs for heavy alcohol use decreased from 4.6% to 1.7%, and VPCs for hashish use increased from 7.3% to 8.3%.
Conclusions: Daily tobacco smoking (in both grades) and heavy alcohol use in the second grade in the gymnasium may be preventable by actions directed against individual-level protective factors including social capital, social support and peer/parent behavior and attitude, while interventions directed at school contexts may be more important for alcohol use in the ninth grade and hashish use in both grades.

1. Introduction

Adolescence is of crucial importance for public health. This is because adolescence constitutes a highly formative period of the life course for several health-related behaviors. Health-related behaviors such as tobacco smoking, alcohol use and hashish use are typically associated with a variety of direct health risks (Sznitman et al., 2013) such as unintentional injuries (Boden & Fergusson, 2011), anti-social behavior (Jessor, Donovan, & Costa, 1991), and early onset of sexual intercourse (Paul, Fitzjohn, Herbison, & Dickson, 2000). Health related behaviors during adolescence also have effects in adulthood. A majority of adult tobacco smokers report having started using in adolescence (Hublet et al., 2006), with tobacco smoking during adolescence associated with increased premature death in adulthood in lung cancer, chronic obstructive lung disease and cardiovascular diseases (Lopez et al., 2010). The risk of alcohol dependence in adulthood is four times increased among those who initiate alcohol use before age 15 compared to those who begin at age 21 (MacKay & Duran, 2007). The long-term effects of illicit drug use of marijuana include an increased risk of poor educational achievement (Fergusson & Boden, 2008), an increase in mental health problems (Dragt et al., 2010), and decreased cognitive functioning (Sanderson, 2004). Adverse health behaviors in adolescence also contribute to the socioeconomic gradient in adult health (Johansen, Rasmussen, & Madsen, 2006).

Health-related behaviors in adolescence are affected by parental, peer and school factors. Parental control and warmth are regarded as essential for youth socialization and health behaviors (Barnes, Hoffman, Welte, Farrell, & Dintcheff, 2006). Adolescent tobacco smoking is associated with living without the biological father, family conflict, maternal smoking, participation in fights (Menezes, Goncalves, Anselmi, Hallal, & Araujo, 2006), and parental socioeconomic factors such as low parental education and immediate family who smoke in the household (Audrain-McGovern et al., 2009). Studies indicate that friends and classmates may influence health behaviors such as tobacco smoking to a greater extent than parents (Johansen et al., 2006; Kristjansson, Sigfusdottir, & Allegrante, 2013). Strong peer effects on adolescent health behavior have also been demonstrated for adolescent binge drinking (Lundborg, 2006), drunkenness (Kristjansson et al., 2013) and cannabis use (Fallu, Brière, & Janosz, 2014).

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http://dx.doi.org/10.1016/j.abrep.2015.03.005

Adolescent tobacco smoking is also associated with age, sex, current grade in the school system (Leatherdale & Burkhalter, 2012), low self-efficacy, having pocket money (Leatherdale & Ahmed, 2010; Kaai, Manske, Leatherdale, Brown, & Murnaghan, 2014), cost of tobacco (Lovato et al., 2010), tobacco smoking friends (Murnaghan, Leatherdale, Sihvonen, & Kekki, 2008), positive tobacco-related attitudes (Kaai, Leatherdale, Manske, & Brown, 2013; Kaai et al., 2014), and low school-connectedness (Leatherdale, Cameron, Brown, & McDonald, 2005; Kaai et al., 2013, 2014). Heavy alcohol use is associated with age, sex (being male), having a strong connection with friends, having parents with a low level of knowledge of adolescents' daily activities, poor school connectedness, obtaining alcohol from adults and/or friends, peers using alcohol and positive attitude to regular alcohol use (Jackson et al., 2014), poor school performance, delinquency (Moore et al., 2005), and the behavior of peers (Lundborg, 2006; Clark & Loheac, 2007). Hashish use is associated with adolescents' exposure to socially deviant individuals and greater access to cannabis (ter Bogt, Schmid, Gabhainn, Fotiou, & Vollebergh, 2006; ter Bogt et al., 2013), less social control and monitoring (Sampson, Morenoff, & Gannon-Rowley, 2002), and lack of perceived disapproving social norms in the social environment concerning cannabis use (Keyes et al., 2011).

The influence of the school environment on tobacco smoking has mostly been investigated in multilevel analyses analyzing the school level and the individual pupils (Kristjansson et al., 2013; Paek, Hove, & Oh, 2013; Kaai et al., 2013), sometimes with low variance at the school level, e.g. an intra-class correlation in tobacco smoking at the school level from 3.9% in the empty model to 2.3% in the full model, which indicates a comparatively small importance of school context (Kaai et al., 2013). Studies using multilevel analysis on risk of alcohol use and hashish use among adolescents in school are scarcer. One study from Iceland showed an empty model school level intra-class correlations of approximately 10% for daily tobacco smoking, and around 5% for lifetime drunkenness and lifetime cannabis use, which were to an important extent unaffected by the addition of a substantial number of individual lifestyle, socio-demographic and psychosocial factors in the models (Kristjansson et al., 2013). A Swedish study showed significant effects of the school context on binge drinking among adolescents (Svensson, 2010). A Danish study confirmed the notion that adolescent risk behaviors such as tobacco smoking, high alcohol use and cannabis use are more influenced by school context than dietary habits (Johansen et al., 2006). Other recent multilevel studies have investigated the effect of contextual characteristics on adolescent tobacco smoking using contextual variables. The results suggest that the presence of school tobacco control programs and policies (Murnaghan et al., 2008; Lovato et al., 2010), high costs of cigarettes in the proximity of the schools (Lovato et al., 2010), and school neighborhood characteristics such as school location and neighborhood median income (Kaai et al., 2013) was associated with the risk of tobacco smoking among students.

Studies of adults (Lindström, 2003) and adolescents (Thorlindson, Valdimarsdottir, & Jonsson, 2012; Chen, Wu, Chang, & Yen, 2014) show that social capital in the forms of social participation and generalized trust in other people (Putnam, Leonardi, & Nanetti, 1993) is negatively associated with tobacco smoking initiation, continuation and cessation. No studies have investigated the association between generalized trust in others and heavy alcohol use and hashish use among adolescents.

Only few studies have investigated school as a contextual factor behind health-related behaviors such as daily tobacco smoking, heavy alcohol use and hashish use among adolescents, and no previous study has included both social networks and generalized trust in others as social capital indicators in such studies.

The aim of this study was to investigate tobacco smoking, heavy alcohol use and hashish use among adolescents in multilevel analyses including the individual and school context levels.

2. Material and methods

2.1. Study design

The 2012 public health survey among school pupils in Skåne, the southernmost part of Sweden, is a cross-sectional study which was performed primarily in order to assess social, economic, school and health conditions among school pupils in the sixth and ninth grades in primary school (*grundskolan*) and the second grade in secondary school (*gymnasium*). The Swedish school system entails nine compulsory school years in primary school and three school years in secondary school (gymnasium). Most schools in the 33 municipalities in Skåne participated in this study, with the exception of the municipality of Lund regarding the sixth and ninth grades in primary school.

2.2. Participants and procedures

Questionnaires were distributed by the teachers, answered by the pupils and gathered in the class room during school time. Only pupils in the ninth (15–16 year olds) grade in primary school and second (17–18 year olds) grade in the gymnasium are included in this study. A total of 9791 pupils in the ninth grade (of a total 11,735 pupils) participated, which yielded an 83% participation rate, while 9987 pupils in the second grade (total 13,848) in the gymnasium participated, yielding a 72% participation rate. In Sweden, primary school attendance with nine school years (normally children 7–16 years old) is mandatory until the ninth grade and an overwhelming majority also attend secondary school with its three school years (normally adolescents 16–19 years old). The third level of the Swedish educational system is the universities which are not included in this study. Approval was attained from the Ethical Committee at Lund University, Sweden.

2.3. Measures

2.3.1 . Daily tobacco smoking

Daily tobacco smoking was assessed with the question "Do you smoke?" with the answers "No, I have never smoked", "No, but I have tried", "No, I have smoked but stopped", "Yes, every day", "Yes, almost every day", "Yes, at parties" and "Yes, sometimes". Dichotomization was conducted with "Yes, every day" versus the others.

2.3.2 . Heavy alcohol use

Heavy alcohol use was assessed by a question measuring how often a large quantity of alcohol had been consumed in one session. Examples of alcohol were given in different standard containers, i.e. "alcohol corresponding to at least four cans of strong beer ("starköl"), *or* strong cider/alcopop *or* six cans of medium-strong beer ("folköl") *or* a whole bottle of wine *or* 25 cl hard liquor (about 6 shots or drinks)" (Henriksson & Leifman, 2011).

2.3.3 . The use of hashish during the past year

The use of hashish during the past year was assessed with the question "Have you used narcotics during the past twelve months?" with the alternative answers "I have not used narcotics", "No, not during the past twelve months", "Yes, hashish/marijuana", "Yes, ecstasy", "Yes, amphetamine", and "Yes, other narcotics". Dichotomization was conducted with "Yes, hashish/marijuana" versus the others.

2.3.4 . Age

Age was normally 15–16 years in the ninth grade in primary school and normally between 17 and 18 years in the second grade in secondary school.

2.3.5. Country of birth

Participants were born in Sweden with both or one parent born in Sweden, born in Sweden with both parents born abroad, born in other