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Associations of physical activity and sport and exercise with at-risk substance use in young men: A longitudinal study

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ABSTRACT

Objective. This study aims to measure the associations of physical activity and one of its components, sport and exercise, with at-risk substance use in a population of young men.

Method. Baseline (2010–2012) and follow-up (2012–2013) data of 4748 young Swiss men from the Cohort Study on Substance Use Risk Factors (C-SURF) were used. Cross-sectional and prospective associations between at-risk substance use and both sport and exercise and physical activities were measured using Chi-squared tests and logistic regression models adjusting for covariates.

Results. At baseline, logistic regression indicated that sport and exercise is negatively associated with at-risk use of cigarettes and cannabis. A positive association was obtained between physical activity and at-risk alcohol use. At baseline, sport and exercise was negatively associated with at-risk use of cigarettes and cannabis at follow-up. Adjusted for sport and exercise, physical activity was positively associated with at-risk use of cigarettes and cannabis.

Conclusion. Sport and exercise is cross-sectionally and longitudinally associated with a low prevalence of at-risk use of cigarettes and cannabis. This protective effect was not observed for physical activity broadly defined. Taking a substance use prevention perspective, the promotion of sport and exercise among young adults should be encouraged.

Introduction

In developed countries, heavy substance use is estimated to cause one third of deaths in young people (Toumbourou et al., 2007). Alcohol and illicit drug use are respectively the first and fifth risk factors for incident disability-adjusted life-years in 10–24-year-olds (Gore et al., 2011). In addition to the disease burden, research shows that most adolescent risk-taking behaviors, including substance use, track into adulthood and lead to health inequalities (Due et al., 2011). Understanding risk and protective factors for substance use is therefore an area of utmost importance for public health in young adults.

Numerous cross-sectional studies have been undertaken on the link between sport and substance use in young people. Regular sporting activity was found to be negatively associated with cigarette smoking (Lisha and Sussman, 2010; Mattila et al., 2012; Terry-McElrath and O'Malley, 2011) and cannabis use (Lisha and Sussman, 2010; Terry-McElrath and O'Malley, 2011), but positively associated with alcohol use (Lisha and Sussman, 2010; Terry-McElrath and O'Malley, 2011). Other authors reported less conclusive relationships (Verkooijen et al., 2008). The theme of sporting activity and substance use has only been addressed by a few recent longitudinal studies. Adolescence sporting activity was associated with an increasing use of alcohol over time (Eitle et al., 2003; Mays et al., 2010; Peck et al., 2008; Wichstrom and Wichstrom, 2009), but was found to be negatively associated with future cigarette smoking and cannabis use (Audrain-McGovern et al., 2012; Terry-McElrath and O'Malley, 2011; Wichstrom and Wichstrom, 2009).

An important deficiency in this area of research is that the aforementioned studies focused on sport and exercise, but did not cover other components of physical activity, including everyday physical activities during work, leisure time, housework and travel. Physical activity and sport and exercise are often used interchangeably but they are not equivalent, as Khan et al. (2012) recently underlined. They are also not mutually exclusive. Actually, sport and exercise is one component of physical activity. An individual may reach a given level of physical activity by playing tennis twice per week, and another individual may walk 30 min each day to get to work, but otherwise play no sport or

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do no exercise. There is strong evidence that the health benefits of physical activity (e.g. prevention of cardiovascular disease) are not restricted to vigorous exercise, but result also from moderately intense physical activities (Haskell et al., 2007; Lee et al., 2000, 2001, Leon et al., 1987; Manson et al., 2002; Paffenbarger et al., 1986). The importance of regular physical activity has also been emphasized in young people (Mountjoy, 2011). Although a few notable studies conducted on adolescent students' at-risk substance use took into account physical activity not related to sport and exercise, and suggested a protective effect of physical activity (e.g. Kulig et al., 2003; Nelson and Gordon-Larsen, 2006), their conclusions cannot be generalized to young adults, for whom the relationship between physical activity and at-risk substance use has only been addressed by focusing on sport and exercise, but never by also considering the other components of physical activity.

The present study, therefore, aims to measure the cross-sectional and prospective associations between at-risk substance use and both physical activity and sport and exercise in a population of young men.

Methods

Study design

Data from the Cohort Study on Substance Use Risk Factors (C-SURF) were analyzed. Participants were enrolled from 3 of 6 national army recruitment centers, covering 21 of 26 Swiss cantons (including all French-speaking ones). This provided a representative sample of young Swiss men, because army recruitment is obligatory in Switzerland and no pre-selection of recruits exists. However, baseline and follow-up assessments were done outside the army environment using questionnaires sent to home addresses. Baseline data were collected between September 2010 and March 2012, and follow-up data 15 months later, between January 2012 and April 2013.

Participants

At baseline, a total of 5990 participants completed the questionnaire. Among them, 5223 (87.2%) completed the follow-up questionnaire. Furthermore, a total of 475 participants were excluded for missing data ($N = 156$) or outlying physical activity values ($N = 319$). The analyses were based on a final sample consisting of 4748 participants (90.9% of follow-up responders). Excluded respondents had comparable baseline levels of physical activity (linear by linear association Chi-squared test, $p = .266$) and sport and exercise ($p = .351$) to participants included in the analyses. As recently reported by Studer et al. (2013), based on a short substance use questionnaire that was completed directly during recruitment regardless of any subsequent participation in the larger cohort study, the effects of non-response could be analyzed. Generally, effects were small. Lausanne University Medical School's Clinical Research Ethics Committee approved this study (Protocol No. 15/07).

Measures

Physical activity, sport and exercise, at-risk substance use and covariates were assessed at baseline. At follow-up, only at-risk substance use was assessed.

Physical activity

The level of physical activity was estimated using the short form of the International Physical Activity Questionnaire (IPAQ) (Gauthier et al., 2009). This covers activities performed at work, at home, when on the move and during leisure time (including sport and exercise). A multicenter study indicated adequate psychometric properties, at least as good as other established self-reports (Craig et al., 2003). The guidelines for data processing and analysis of the IPAQ (IPAQ Research Committee) were strictly followed. Briefly, algorithms that take into account the frequency, volume and intensity of the reported physical activities classify participants' level of physical activity as 'high', 'moderate' or 'low'.

Sport and exercise

A single question was used to measure sport and exercise: "Over the past 12 months, how often did you play sports or exercise?" Response choices were 1 = never, 2 = a few times a year, 3 = 1 to 3 times per month, 4 = at least once per week or 5 = almost every day. Sport and exercise was computed as 'never/rare' (1 or 2), 'occasional' (3) or 'regular' (4 or 5).

At-risk alcohol use

Both risky single occasion drinking (RSOD) and drinking volumes were considered. RSOD was defined as consuming at least 6 standard drinks on a single occasion (McLeod et al., 1999; World Health Organization, 2000). Pictures of standard drinks containing 10–12 g of pure alcohol were provided. At-risk RSOD was defined as RSOD at least monthly. Drinking volumes were assessed with the usual number of drinking days in a week and an open-ended question about the number of standard drinks consumed on those days. At-risk drinking volume was defined as 21 or more drinks per week (Marmot et al., 1995). Finally, at-risk alcohol use was defined as at-risk RSOD and/or at-risk drinking volume.

At-risk cigarette use

Participants were asked whether they had smoked cigarettes over the past 12 months. Frequency of cigarette use was recorded as 'once per month or less', '2–3 days per month', '1–2 days per week', '3–4 days per week', '5–6 days per week' and 'every day'. At-risk cigarette use was defined as a frequency of 5 days per week or more.

At-risk cannabis use

Similarly, participants were asked whether they had used cannabis over the past 12 months. Frequency of cannabis use was recorded as 'once per month or less', '2–4 times per month', '2–3 times per week', '4–5 times per week' and 'every day or almost every day'. At-risk cannabis use was defined as 2 times per week or more.

It is important to mention that the cut-offs used to define at-risk use of alcohol, cigarettes and cannabis do not imply that lower frequencies of use are safe. Nonetheless, they provide a valuable way of identifying individuals more at-risk of developing substance-related problems (EMCDDA, 2008).

Covariates

Covariates were measured and recorded as follows: *age*, *body mass index* (*BMI*) ('Underweight' [BMI < 18.5 kg/m^2]; 'Normal' [$18.5 \leq$ BMI < 25.0 kg/m^2]; 'Overweight' [$25.0 \leq$ BMI < 30.0 kg/m^2]; 'Obesity' [BMI ≥ 30.0 kg/m^2]), *language* ('German'; 'French'), *financial situation* ('below average'; 'average or above'), *highest educational level achieved* ('lower secondary school'; 'vocational upper secondary school'; 'general upper secondary school' [high school or equivalent]; 'tertiary' [university or other graduate school]), *parents' educational level* ('lower secondary school'; 'vocational upper secondary school'; 'general upper secondary school' [high school or equivalent]; 'tertiary' [university or other graduate school]), *employment status* ('employed'; 'student'; 'inactive' [unemployed, social, disability pension]), and *type of community* ('rural' [below 10,000 inhabitants]; 'urban' [10,000 inhabitants or above]).

Statistical analysis

The analysis was conducted using an SPSS 21 software. Descriptive statistics were used to present the prevalence of at-risk substance use according to physical activity and sport and exercise. Linear by linear association Chi-squared tests were computed to test for any effects of physical activity and sport and exercise on at-risk substance use. To assess cross-sectional associations at baseline, 3 multiple logistic regression models were constructed by incorporating at-risk substance use as the dependant variable, and physical activity (model 1), sport and exercise (model 2) and physical activity and sport and exercise (model 3) as the independent variables. These models were run separately for at-risk use of alcohol, cigarettes and cannabis. In order to correct for influent factors, covariates were added to the models. Because physical activity and sport and exercise are variables with 3 ordinal modalities, the linear by linear association was also tested (models 1 and 2 only). To assess whether physical activity and sport and exercise at baseline were associated with at-risk use of alcohol, cigarettes and cannabis at follow-up (prospective associations), multiple logistic regression models were computed using the same procedure, but adjusting for baseline at-risk use of alcohol, cigarettes and cannabis respectively. The linear by linear association was also tested.

Results

Table 1 displays the demographic and anthropometric characteristics of the sample. Mean (standard deviation) age was 19.96 (1.21) years at baseline and 21.26 (1.23) years at follow-up. Fig. 1 illustrates