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Repeated self-reported injuries and substance use among young adolescents: the case of Switzerland

Summary

Objectives: The prevalence of repeated self-reported injuries among adolescents between 12 and 15 years of age and the association with the use of alcohol, drugs, and intense sporting activity are described.

Methods: A Swiss national representative sample of 7196 adolescents completed a questionnaire in 1998. They were asked about their use of alcohol and drugs and whether they had suffered injuries requiring medical attention in the preceding 12 months. "Repeated injuries" were defined as three or more reported injuries.

Results: 46.8 % males and 43.8 % females reported one or more injury in the previous 12 months. Ten percent of the males and 8.6 % of the females reported repeated injuries. Regular use of alcohol (odds ratio (OR): 1.55, confidence interval (CI): 1.23–1.96), drunkenness (OR: 1.73, CI: 1.34–2.22), use of illegal drugs (for 14 and 15 year-olds: OR: 1.84, CI: 1.05–3.23) and intense sporting activity (OR: 1.59, CI: 1.31–1.93) were risk factors for repeated injuries, whilst gender was not (OR: 0.99, CI: 0.81–1.20).

Conclusions: The occurrence of repeated injuries is frequent among adolescents, and is associated with use of alcohol, illegal drugs, and intense sporting activity.

Keywords: Adolescents – Repeated injuries – Alcohol – Cannabis – Illegal drugs – Gender.

Unintentional injuries are the major causes of death, hospital admission and emergency department visits among adolescents in the United States (Lescohier & Scavo Gallager 1996) and in other industrialised countries such as Switzerland (Chiolero & Schmid 2000). They represent the leading cause of death in this group and death rates due to injuries have increased in recent decades (Runyan & Gerken 1989). Nonfatal injuries are at least 1000 times more frequent than fatal injuries (cf. Lescohier & Scavo Gallager 1996) and the impact on the public health system in terms of disability and costs is massive (Rivara et al. 1997).

Measures of injury morbidity often rely on hospital registers, which underestimate the prevalence of injury (Lescohier & Scavo Gallager 1996; Currie et al. 1996; Williams et al. 1998). The use of self-completed questionnaires allows a larger coverage of the full range of injuries (Currie et al. 1996; Williams et al. 1998), a description of the context of the injury and of behavior patterns of the subjects involved. Moreover, a self-completed questionnaire allows the identification of youth who suffer from repeated injuries. Few studies pay attention to the fact that some adolescents have repeated injuries (Currie et al. 1996; Choquet & Ledoux 1994). Yet, these adolescents are exposed to direct and potentially crucial health consequences due to these injuries. They are an important target group for the prevention of injuries. However, key elements for identifying this group are largely missing, and most have not addressed whether risky behavior (Irwin & Millstein 1986; Jessor 1991) such as substance use (alcohol, tobacco, or illegal drugs) is associated with the occurrence of repeated injuries.

Injury events have to be seen as a complex interplay between personal and environmental factors, triggered by several causes. They differ for example for age, sex, and socioeconomic status (Lescohier & Scavo Gallager 1996). However, it is hard or even impossible to modify theses factors. Apart from environmental factors and non-modifiable personal factors many studies underline the role of individual behavioural factors and their link to injuries. Behavioural factors are very prominent for health professionals, because the focus lies on more or less modifiable risk factors. Whether these factors can be used to predict the risk of

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injury (Slap et al. 1991), is still a matter of discussion. For repeated injuries, it has been proposed that personal factors may play a more important role than environmental factors (Mannheimer & Mellinger 1997).

Two behavioral aspects have often been linked to injuries. On one hand, risky behaviour, such as use of alcohol (Currie et al. 2000), is more prevalent among male adolescents and is associated with injuries in young people (Hicks et al. 1990; Maio et al. 1994). Using emergency room data, Maio et al. (1994) found that injured adolescents attending the trauma centre with positive serum alcohol concentrations (SAC) more often had a previous or subsequent injury than injured adolescents with a negative SAC. Based on self-report data from adolescents, Spirito et al. (1997; 2000) observed that a high proportion of self-reported injuries were related to alcohol or drug use and risk-taking behaviour. Use of other psychoactive substances, such as tranquilizers/sleeping pills, antidepressants and stimulants, has also been associated with injury occurrence among young adults (Regidor et al. 1996). Using a self-completed questionnaire of a household sample of adults aged 18 years and older, Cherpitel (1993b; 1999) considered all types of injuries and was able to show an association with alcohol consumption and with risk-taking behaviour.

On the other hand, sport-related injuries are common, especially among adolescents. Williams et al. (1998) found that 39.3% of all medically attended injuries among males aged 11 to 15, and 24.1% among females, were related to sporting activities. Moreover, this study showed that a high level of participation in sports is associated with a greater risk of injury. Others found that adolescent athletes put themselves at greater risk of accidental injuries (Baumert et al. 1998).

To our knowledge, no study has analysed the risk of repeated injuries among young adolescents aged 12 to 15, based on both behavioural risk factors, i.e., use of substances (alcohol, tobacco, and illegal drugs) and intensity of sporting activity. This would allow to compare the relative importance of the risk of repeated injuries associated with the use of substances and with the intensity of sporting activities. The present study is based on the Swiss 1998 Health Behaviour in School-aged Children (HBSC) survey (Currie et al. 2000). It is the most recent survey that assesses self-reported injuries, intensity of sporting activity and use of substances among a national representative sample of adolescents aged 12 to 15. In detail, we test four hypotheses:

1) An important part of the total number of injuries requiring medical attention among young adolescents consists of repeated injuries.
2) There exists an association between the use of substances such as alcohol, tobacco, or illegal drugs and repeated injuries.
3) There exists an association between intensive sporting activity and repeated injuries.
4) Both risk factors, substance use and sporting activity, show independent and equally strong associations with repeated injuries. In addition, we assume no interaction effect between substance use and sporting activity on repeated injuries.

Method

The data was collected as the Swiss component of the 1997/98 "Health Behaviour in School-Aged Children: a WHO Cross-National Study (HBSC*)" in which 28 countries and regions participated (Currie 1998). This survey collects data on a wide range of health behaviour and health indicators, and factors that may influence them. The HBSC study is designed to increase the understanding of the health behaviour and lifestyles of young people in different countries. In 1998, the Swiss Institute for Prevention of Alcohol and Drug problems (SIPA) conducted the survey for Switzerland, with the funding of the cantons and the Swiss Federal Office for Public Health.

Sample

The HBSC study used a cluster sampling procedure, with classrooms as the sampling unit. The 5th to 9th grade classes to take part in the study were randomly selected, on the basis of the Swiss Federal Office of Statistics' file, which lists all classes in Switzerland. Permission to conduct the study was requested from cantonal authorities and from each school head mister or mistress. 612 classes of public schools were selected, of which 73 classes refused to participate or did not return the questionnaires within the required time. After two written recalls, the overall response rate was 88.1%. The sample was composed of 9756 schoolchildren aged between10 and 16 years. Our study is based on a sub-sample of children between the age of 12 and 15 (n = 7196), which is representative for Switzerland. Representation of 10-, 11-, and 16-year-olds could not be ascertained, because in some Swiss cantons these age groups are not or are no longer in grades 5 to 9.

* HBSC is a WHO/EURO collaborative study. International Coordinator of the 1997–98 study: Candace Currie, University of Edinburgh, Scotland; Data Bank Manager: Bente Wold, University of Bergen. This publication reports on data from Switzerland (PIs: Béatrice Janin Jacquat & Holger Schmid).

The subsample was composed of 3618 males (50.3%) and 3578 females (49.7%). Nearly 80% of the participants were Swiss, with the remainder being mostly Italian, Portuguese, Spanish, or of other European descent. 25%, 26.0%, 25.3% and 23.7% of the adolescents taking part in the survey were aged 12, 13, 14 and 15 years respectively. The level of socio-economic status (SES) was based on the higher occupation of father or mother and classified according to this characteristic from the highest (I) to the lowest (VI) socio-economic status (I: Senior manager, professional; II: Middle manager; III: Clerical; IV: Self-employed worker, farmer; V: Skilled or unskilled manual; VI: Unemployed, retired, student). SES was I for 8.9%, II for 8.6%, III for 24.7%, IV for 33.7%, V for 7.6% and VI for 3.9% of the sample. 13% could not be classified because of missing or unclassifiable data on the occupation of father or mother.

Instrument

The data were gathered anonymously through a self-completed questionnaire, which was distributed between March and May 1998. Teachers administered the questionnaires in the classroom and were instructed to answer questions about the procedure only. Adolescents completed the questionnaires independently during one school period (approximately 45 minutes) and were provided with envelopes in which to seal their questionnaires upon completion. Questions about the location in which injuries occurred and their consequences as well as about the use of illegal drugs were only distributed to adolescents between 14 and 15 years of age in the 8th and 9th grades. The questions were limited to the older groups for two reasons: firstly, for ethical reasons, meaning that the questions were considered as being too intrusive for younger pupils and secondly, to allow the adolescents of the lower grades to complete the entire questionnaire in one school period.

Measures

Analyses were performed using injury frequency, venue and consequences of injuries, intensity of sporting activity, and use of substances.

Injury occurrence

The adolescents answered to the question "During the past 12 months, how many times were you injured and had to be treated by a doctor or a nurse?" The possible answers were: "I was not treated by a doctor or nurse for an injury", "1 time", "2 times", "3 times", "4 times or more". The rate of injury per year was calculated by adding the number of injuries registered for each adolescent. Repeated injuries occurrence was defined for adolescents with 3 injuries or more in the previous 12 months. This definition has been proposed by Choquet, Michaud and Frappier (1997).

Use of substances

The frequency of the use of different substances was dichotomised because we were interested to determine whether young adolescents regularly smoked tobacco, regularly drank alcohol and whether they had already been drunk or had used illegal drugs. Adolescents were asked: "How often do you smoke tobacco at present?": "Regular use of tobacco" was defined as smoking tobacco once a week or more; "At the present time, how often do you drink anything alcoholic, such as beer, wine, or liquors?": "Regular use of alcohol" was defined as drinking beer, wine, liquor, spirits, or cocktails, cans or sodas with alcohol, or other alcoholic drinks once a month or more; "Have you ever had so much alcohol that you were really drunk ?": "Drunkenness" was defined as having been drunk once or more. Only older adolescents answered the question: "Have you ever taken one or several of these products in your life?": "Use of cannabis" was defined by having taken joint, pot, grass, cone, marijuana, or hashish once or more and "Use of other illegal drugs" was defined as having taken ecstasy, stimulants (amphetamines, speed), opiates (heroine, opium, morphine), LSD or magic mushrooms once or more.

Intensity of sporting activity

The question was "Outside school hours, how many hours a week do you usually exercise in your free time so much that you get out of breath or sweat?" "Intense sporting activity" was defined as doing intense exercise four hours a week or more.

Statistical analysis

The number of self-reported injuries was calculated based on the sum of the number of injuries reported by each adolescent. In agreement with Roberts et al. (2000), a design-factor of 1.2 was assumed to take account of the clustering of the sample, which was weighted in consequence. We used χ^2-tests to compare the prevalence of repeated injuries among females and males, and to compare the prevalence of repeated injuries by sporting activity and by use of substances for males and females separately. Odds ratios are added as an approximation for the risk of having repeated injuries. The relation between age and SES with the number of injuries was tested using Kendall's τ_b. Hierarchical logistic regression analysis was used to evaluate the risk of reporting repeated injuries. Five models were tested for

adolescents aged between 12 and 15. The first model (Model I) included gender as the sole explanatory variable controlling for age and SES. The second model (Model II) included intensity of sporting activities, regular use of alcohol, getting drunk, and regular use of tobacco. In the third model (Model II_{inter}) interaction terms between substance use and sporting activity were included. For adolescents aged 14 and 15, a fourth model (Model III) was tested that included the use of cannabis and the use of other illegal drugs; a fifth model (Model III_{inter}) adds interaction terms between any kind of substance use and sporting activity. A $p < 0.05$ was taken as the minimum level of significance. All analysis was conducted using SPSS© for Windows.

Results

Overall, 46.8% of the male and 43.8% of the female adolescents ($\chi^2 = 5.2$, df = 1, $p < 0.05$) reported that they had received medical attention for at least one injury during the 12 months prior to the survey (see Table 1).

The rate of injuries calculated as the total number of injuries per total number of adolescents was 836 for 1 000 males per year and 748 for 1000 females per year, i.e., 0.84 and 0.75 injuries per year on average for each male and female. Male adolescents had more repeated injuries than the females, with 10.1% of the males and 8.6% of the females reporting three or more injuries during the 12 months prior to the survey ($\chi^2 = 4.2$, df = 1, $p < 0.05$). There was no correlation between repeated injuries and age ($\tau_b = 0.001$, n.s.) or SES ($\tau_b = 0.011$, n.s.).

Table 1 Proportion of adolescents reporting no, one, two, three, four, or more injuries, for which they were treated by a doctor or a nurse in prior 12 months

Number of injuries	Males % (n)	Females % (n)
None	53.2 (1843)	56.2 (1900)
One	24.8 (861)	25.6 (867)
Two	11.8 (409)	9.6 (324)
Three	5.5 (192)	4.3 (147)
Four or more	4.6 (161)	4.2 (143)

Only adolescents aged 14 and 15 were asked about the venue and consequences of the most serious injury they suffered during the past 12 months. Males were more frequently injured at sport facilities or fields than females: 29.8% and 12.8% respectively ($\chi^2 = 36.4$, df = 1, $p < 0.001$). Males were more frequently injured on streets or roads, but the difference was not statistically significant (17.1% vs 14.2%; $\chi^2 = 1.4$, df = 1, n.s.). Females were more frequently injured at home, 18.8% vs 13.1% ($\chi^2 = 5.1$, df = 1, $p < 0.05$) or at school, 18.3% vs 12.7% ($\chi^2 = 5.0$, df = 1, $p < 0.05$). Most of the injuries were traumatic blows, such as sprains, strains, or pulled muscles (males: 32.3%, females: 39.7%; $\chi^2 = 5.0$, df = 1, $p < 0.05$) or broken bones (males: 26.5%, females: 19.4%; $\chi^2 = 6.0$, df = 1, $p < 0.05$). Other injuries included cuts, puncture, or stab wounds (males: 22.6%, females: 20.5%; $\chi^2 = 0.6$, df = 1, n.s.), black or blue bruises (males:

Table 2 Association between the prevalence of repeated injuries (≥ 3) and alcohol and substance use and intensity of sporting activity

	Males				Females			
	≥ 3 injuries	χ^2, df	OR (CI)	p-value	≥ 3 injuries	χ^2, df	OR (CI)	p-value
Intense sporting activity[a]								
4 hours a week or more	12.8 %	23.1; 1	1.85	<0.001	10.4 %	3.7; 1	1.33	n.s.
Less than 4 hours a week	7.3 %		(1.43–2.39)		8.0 %		(0.99–1.78)	
Regular use of alcohol[a]								
Once a month or more	15.0 %	29.0; 1	1.96	<0.001	13.7 %	25.3; 1	2.06	<0.001
Less than once a month or never	8.3 %		(1.53–2.52)		7.2 %		(1.55–2.74)	
Drunkenness[a]								
At least once in the life	16.1 %	31.2; 1	2.07	<0.001	15.1 %	31.5; 1	2.30	<0.001
Never	8.5 %		(1.60–2.69)		7.2 %		(1.71–3.09)	
Regular use of tobacco[a]								
Smoke once a week or more	13.1 %	3.5; 1	1.40	n.s.	15.8 %	26.3; 1	2.32	<0.001
Less than once a week or never	9.7 %		(0.98–1.99)		7.5 %		(1.67–3.22)	
Use of cannabis[b]								
At least once in the life	11.4 %	3.4; 1	1.51	n.s.	12.0 %	6.3; 1	1.80	<0.05
Never	7.9 %		(0.97–2.34)		7.1 %		(1.13–2.86)	
Use of an other illegal drugs[b]								
At least once in the life	17.5 %	5.3; 1	2.28	<0.05	20.4 %	10.0; 1	3.08	<0.01
Never	8.5 %		(1.11–4.69)		7.7 %		(1.48–6.41)	

Note: [a] 12 to 15 years old adolescents (males $n_{unweighted} = 3618$; females $n_{unweighted} = 3578$) and [b] 14 to 15 years old adolescents (males $n_{unweighted} = 1291$; females $n_{unweighted} = 1392$); illegal drugs (other than cannabis) are ecstasy, stimulants (amphetamines, speed), opiate (heroin, opium, morphine), cocaine, coke, LSD, and magic mushrooms. OR = odds ratio; IC = 95 % confidence interval.

18.1%, females: 22.5%; $\chi^2 = 2.9$, df = 1, n.s.), concussions or other head or neck injuries (males: 9.2%, females: 8.8%; $\chi^2 = 0.1$, df = 1, n.s.), burns (males: 3.9%, females: 2.6%; $\chi^2 = 1.4$, df = 1, n.s.) and poisoning (males: 1.4%, females: 1.5%; $\chi^2 = 0.3$, df = 1, n.s.).

Prevalence of repeated injuries by sporting activities, and by use of substances are presented separately for males and females in Table 2.

The prevalence of repeated injuries was higher among adolescents who participated in physical activity at least four hours a week, but the difference did not reach statistical significance among females (p = 0.06). Among adolescents who got drunk or drank alcohol regularly, the prevalence of repeated injuries was higher for males than females. Smoking was also associated with a higher prevalence, with a significant association among females but not among males (p = 0.07). Use of cannabis was associated with a higher prevalence of repeated injuries, but this association did not reach statistical significance among males (p = 0.08). Use of other illegal drugs was associated with a higher prevalence of repeated injuries among both males and females.

The results of the models used for the logistic regression analysis are shown in Table 3.

Using gender as the sole explanatory variable (Model I) and controlling for age and SES, male adolescents showed 21% higher odds of repeated injuries. However, by including the variables: intense sporting activities, regular use of alcohol, drunkenness and regular use of tobacco (Model II), the gender difference seemed to be explained exclusively by differences in use of substances and in the intensity of sporting activities. The odds of repeated injuries among adolescents doing sports four hours a week or more were 59% higher than among adolescents who did not. The results indicate that the odds of repeated injuries were 55% higher when drinking regularly and 73% higher if the adolescent had been drunk at least once in his or her lifetime. In the third model (Model II_{inter}), no interaction term turned out to be significant.

Similar results were found with the complementary model used for adolescents aged between 14 and 15, who answered the questions about the use of illegal drugs (Tab. 3, Model III). However, drunkenness was no longer a predictor of repeated injuries. The use of illegal drugs other than cannabis was found to be the strongest predictor for repeated injuries. On the other hand, use of cannabis was not a predictor for repeated injuries. Once again, the interaction of substance use and sporting activity had no significant effect (Model III_{inter}).

Table 3 Logistic regression analysis for the risk of reporting repeated injuries (≥ 3 injuries versus ≤ 2 injuries in prior 12 months)

	Model I[a] OR (CI)	p-value	Model II[a] OR (CI)	p-value	Model II_{inter}[a] OR (CI)	p-value	Model III[b] OR (CI)	p-value	Model III_{inter}[b] OR (CI)	p-value
Male gender	1.21 (1.01–1.45)	< 0.05	0.99 (0.81–1.20)	n.s.	0.99 (0.81–1.20)	n.s.	0.88 (0.63–1.23)	n.s.	0.88 (0.63–1.23)	n.s.
Intense sporting activity			1.59 (1.31–1.93)	< 0.001	1.62 (1.27–2.07)	< 0.001	1.54 (1.11–2.15)	< 0.05	1.56 (0.94–2.57)	n.s.
Regular use of alcohol			1.55 (1.23–1.96)	< 0.001	1.70 (1.22–2.37)	< 0.01	1.71 (1.17–2.48)	< 0.01	1.85 (1.09–3.14)	< 0.05
Drunkenness			1.73 (1.34–2.22)	< 0.001	1.65 (1.15–2.36)	< 0.01	1.25 (0.84–1.88)	n.s.	1.14 (0.64–2.03)	n.s.
Regular use of tobacco			1.17 (0.87–1.56)	n.s.	1.12 (0.75–1.68)	n.s.	1.17 (0.74–1.85)	n.s.	1.06 (0.54–2.08)	n.s.
Use of cannabis					-		0.99 (0.66–1.48)	n.s.	0.96 (0.54–1.71)	n.s.
Use of other illegal drugs					-		1.84 (1.05–3.23)	< 0.05	2.52 (1.16–5.48)	< 0.05
Intense sporting activity x regular use of alcohol					0.83 (0.53–1.33)	n.s.			0.85 (0.40–1.79)	n.s.
Intense sporting activity x drunkenness					1.11 (0.67–1.82)	n.s.			1.21 (0.54–2.74)	n.s.
Intense sporting activity x regular use of tobacco					1.08 (0.61–1.91)	n.s.			1.17 (0.47–2.92)	n.s.
Intense sporting activity x use of cannabis									1.05 (0.47–2.37)	n.s.
Intense sporting activity x use of other illegal drugs									0.53 (0.17–1.66)	n.s.

Note: all analyses are controlled for age and socio-economic status (SES). [a] the models I, II, and II_{inter} are based on the sample of the 12 to 15 years old adolescents ($n_{unweighted}$ = 7196); [b] the model III and III_{inter} are based on the sample of the 14 to 15 years old adolescents ($n_{unweighted}$ = 2683) having answered to questions on the use of illegal drugs; illegal drugs (other than cannabis) are ecstasy, stimulants (amphetamines, speed), opiate (heroin, opium, morphine), cocaine, coke, LSD, and magic mushrooms; OR = odds ratio; CI = 95 % confidence interval. The models II_{inter} and III_{inter} include interaction terms between substance use and sporting activity.

Discussion

Our study shows that nearly half of all adolescents between the age of 12 and 15 reported at least one injury requiring medical attention in the prior 12 months. The prevalence of repeated injuries is considerable, involving one out of 10 adolescents, males being more frequently affected. We can conclude, that an important part of the total number of injuries is caused by young people who suffer from repeated injuries (Hypothesis 1). Statistically significant associations between repeated injuries and the use of substances as well as intensive sporting activity can be found (Hypothesis 2 and 3). The multivariate analysis reported here shows that regular consumption of alcohol or drunkenness, on one hand, and intense sporting activity, on the other, are independent and equally strong predictors of repeated injuries and that no interaction can be found (Hypothesis 4). The complementary model used for older adolescents demonstrates that the use of illegal drugs (other than cannabis) is an independent predictor of repeated injury occurrence. For these models, gender is not an independent predictor of repeated injuries.

Using self-report, Jelalian et al. (1997) showed that adolescents aged between 14 and 18 report an average of 1.0 and 1.2 injuries requiring medical attention, per year, females and males respectively. These values are slightly higher than ours. In the context of the 1994 HBSC study in Scotland, Currie et al. (1996) found that 41.9% of the 11-, 13-, and 15-year-olds reported at least one medically attended injury, and males reported them more frequently than females. Very few studies have evaluated the occurrence of repeated injuries. Choquet's et al. (1997) results were similar to ours for adolescents aged between 11 and 19, but showed larger differences between males and females: 14.3% of the males and 5.8% of the females reported three or more injuries, which required medical attention in the 12 months prior to the survey. It is possible that our survey underestimates the prevalence of injuries. Self-report could be biased by participant recall or inaccuracy and rates of adolescent injuries have been shown to be significantly higher when self-report data are based on one month rather than on 12-month recall (Harel et al. 1994).

The hypothesis that the use of substances, such as alcohol or illegal drugs, is a strong predictor of repeated injuries and comparable with intense sporting activity was supported. Two main explanations could be given for the association between use of substance and injury occurrence. One explanation is that these substances have a direct effect on the central nervous system altering psychomotor and cognitive functions that can facilitate the occurrence of an injury (Spirito et al. 1997; Spirito et al. 2000; Regidor et al. 1996). This may be valid for alcohol, which reduces coordination and balance, increases reaction time and impairs attention, perception, and judgment – all of which increase the risk of accidental injury (Cherpitel 1993a). For other substances, however, it is questionable because of the stimulating effect of some drugs. Moreover, it was not known whether adolescents had taken any drugs at the time of injury. Our study evaluated all kinds of injuries but was not limited to injuries related to alcohol or drug intake. A second explanation is that adolescents with repeated injuries could frequently be sensation-seekers (Zuckerman 1979). Some people may have a need for increased arousal, which makes them actively seek ways of increasing their stimulation either internally, through the intake of substances, or externally, through intense and extreme sports activities, for example. These behaviours may expose them to greater risk of injury. Our survey does not allow us to test this aspect. However, Cherpitel (1999) analysed self- reported injuries among the general population (aged 18 years or more) and found associations between injury and moderate drinking, drug use and "risk-taking dispositions", which included the sensation-seeking personality trait. However, rigorous outcome evaluation is largely missing, and most have not addressed the specific needs and values of the target groups. When logistic regression analysis was applied, only risk-taking disposition remained significantly associated with injury. But the same author had shown in a previous study with a similar design that alcohol consumption was a significant predictor of injury even when risk-taking disposition was controlled for (Cherpitel 1993b).

The results of this study may have implications for prevention, especially for secondary prevention. From our results, it may be concluded that, when treating an adolescent for an injury and particularly when injuries are repeated, the health care provider should evaluate the use of substances and if necessary inform the adolescent about the problems associated with substance intake (Irwin & Millstein 1986). Especially in the field of emergency medicine, professionals should be aware of the association between repeated injuries and frequent use of substances, and try to address all the potential components of the injured adolescent's problem (Maio et al. 1994). This could be an indication for secondary prevention and early detection of problems with substance use. Maio et al. (2000) states that the post-injury period may provide a "teachable moment" to stress interventions for preventing future injuries resulting from alcohol use or abuse. Monti et al. (1999) demonstrated that specific brief interventions for harm reduction among older adolescents treated in an emergency room, following an alcohol-related event, proved to be more effective than

standard care in reducing subsequent alcohol related-problems. The intervention was based on the principals of the motivational interview approach (Miller & Rollnick 1991) with a review of the event circumstances, exploration of motivation (pros and cons), personal assessment and feedback regarding risk behaviour, imagining the future, and establishing goals.

One possible limitation to this lies in the fact, that young people treated in an emergency room cannot be compared with adolescents reporting injuries from a population-based survey such as HBSC. This remains unresolved, however, Pickett et al. (2000) demonstrated that a similar pattern of youth injuries was found when identified through a national emergency department surveillance system or through the HBSC survey.

An important limitation of our study is, that we considered *all* possible types of injuries together. This does not allow for the tracking of specific risk factors for specific injuries and may lead to biased conclusions for prevention. For instance, it is likely that adolescents with intense sporting activities are reporting frequent sport injuries, whilst adolescents using substances may be prone to frequent injuries on the street or on the road. However, the study of Baumert et al. (1998) showed that adolescent athletes are at greater risk than non-athletes for unintentional injuries as a result of their risk taking behavior in the field of road traffic. Another shortcoming is that we did not ask for self-inflicted and non-self-inflicted injuries; an information that is normally available for health professionals when it comes to accidents. It may be, that both signs, the repetition of injuries together with the fact of being self-inflicted, are clear indications for preventive action. The possible association between these injury characteristics may not only pose an elevated risk to adolescents' health, but also challenges our ability to develop and implement prevention and treatment programmes.

Future research should focus on secondary prevention evaluation. Injured adolescents, and especially those reporting repeated injuries, could be tested systematically for the use of substances; a measure that has been proposed by different authors (Maio et al. 1994; Monti et al. 1999). Drug testing, however, raises a number of complex social, ethical, legal, and technical issues that are not resolved. Drug testing is intrusive and infringes on the individual's rights to privacy. Informed consent should be asked for and the right to refuse should be given. If found positive, specific intervention designed to reduce the use of any substances (not only alcohol) or other injury risk-related factors should be implemented and followed up in order to observe whether such intervention reduces the use of substances and the occurrence of injuries. The cost-effectiveness of such intervention should be evaluated (Maio et al. 2000). The stakes are important because of the high prevalence of intake of substances among young adolescents with potential health consequences (Wayne & Blum 1996) and the stable but substantial injury morbidity and mortality of adolescents.

Zusammenfassung

Wiederholtes selbstberichtetes Unfallgeschehen und Substanzkonsum bei Jugendlichen in der Schweiz

Fragestellung: Die Prävalenz von wiederholten selbstberichteten Unfällen und Verletzungen bei Jugendlichen im Alter von 12 bis 15 Jahren und Zusammenhänge zum Alkohol- und Drogenkonsum sowie zu intensiver sportlicher Aktivität werden beschrieben.

Methoden: 1998 wurde in der Schweiz eine repräsentative Befragung von 7196 Jugendlichen durchgeführt. Angaben zum Konsum von Drogen sowie zur Häufigkeit von Unfällen und Verletzungen in den vorangehenden 12 Monaten wurden erhoben. Drei und mehr selbstberichtete Vorkommnisse wurden als wiederholte Unfälle und Verletzungen definiert.

Ergebnisse: 46,8 % der männlichen und 43,8 % der weiblichen Befragten berichteten von Unfällen oder Verletzungen innerhalb der letzten 12 Monate. 10 % der männlichen und 8,6 % der weiblichen Befragten berichteten von wiederholten Vorkommnissen. Regelmässiger Alkoholkonsum (odds ratio (OR): 1,55, confidence interval (CI): 1,23–1,96), Betrunkenheitserlebnisse (OR: 1,73, CI: 1,34–2,22), Konsum von illegalen Drogen (bei 14- bis 15-Jährigen: OR: 1,84, CI: 1,05–3,23) und intensive sportliche Aktivität (OR: 1,59, CI: 1,31–1,93) sind Risikofaktoren für wiederholte Unfallvorkommnisse. Das Geschlecht ergab keine signifikanten Zusammenhänge (OR: 0,99, CI: 0,81–1,20).

Schlussfolgerungen: Wiederholte Unfälle und Verletzungen treten bei Jugendlichen häufig auf und es bestehen Zusammenhänge zum Konsum von Alkohol und illegalen Drogen sowie zu intensiver sportlicher Aktivität.

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Résumé

Les accidents à répétition et la consommation d'alcool et de drogues chez les adolescents, la situation en Suisse

Objectifs: Mesurer la prévalence des accidents à répétition chez les adolescents de 12–15 ans et son association avec la consommation d'alcool, de tabac et de drogues illégales, et une activité sportive intense.

Méthodes: Un échantillon représentatif pour la Suisse de 7196 adolescents a été interrogé en 1998 sur la consommation d'alcool, de tabac et de drogues illégales, et sur les accidents ayant nécessité des soins médicaux dans les 12 mois précédants.

Résultats: 46,8 % des garçons, 43,8 % des filles rapportent avoir eu au moins un accident. 10,0 % des garçons, 8,6 % des filles rapportent avoir eu trois accidents ou plus (accidents à répétition). La consommation régulière d'alcool (odds ratio (OR): 1,55, intervalle de confiance à 95 % (IC): 1,23–1,96), le fait d'avoir été soûl (OR: 1,73, IC: 1,34–2,22), la consommation de drogues illégales (chez les 14–15 ans : OR: 1,84, IC: 1,05–3,23) et une activité sportive intense (OR: 1,59, IC: 1,31–1,93) sont des facteurs de risque indépendants d'accidents à répétition, mais pas le sexe (OR: 0,99, IC: 0,81–1,20).

Conclusions: Les accidents à répétition sont fréquents chez les adolescents et sont associés à la consommation d'alcool et de drogues illégales, ainsi qu'à une activité sportive intense.

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