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Sport Practice Among Adolescents With Chronic Health Conditions

&

**Are Adolescents With Chronic Conditions Particularly at Risk of
Bullying?**

THESE

préparée sous la direction du Docteur Joan-Carles Suris, Privat-Doctent et Maître
d'Enseignement et de Recherche
avec la co-direction du Professeur Fred Paccaud
avec la collaboration du Professeur Pierre-André Michaud

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par

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Madame le Professeur Stephanie Clarke
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RAPPORT DE SYNTHÈSE

Les deux articles présentés dans ce mémoire de thèse sont le résultats de recherches effectuées au sein du Groupe de Recherche sur la Santé des Adolescents, affilié à l'Unité Multidisciplinaire de Santé des Adolescents du Centre Hospitalier Universitaire Vaudois. Les études qui constituent les présents articles ont pour thème commun la santé des adolescents atteints d'affections chroniques, à savoir d'une maladie chronique et/ou d'un handicap physique. Les données qui ont servi à ces deux études sont issues de l'enquête SMASH02 (Swiss Multicenter Adolescent Survey on Helath 2002), une étude transversale multicentrique, menée en 2002 dans les écoles post-obligatoires de la majorité des cantons suisses par l'intermédiaire de questionnaires anonymes. 7548 adolescents de 16 à 20 ans ont été recrutés dans cette enquête, qui porte sur de nombreux aspects de la santé et des modes de vie des adolescents. Les analyses des données ont été effectuées à l'aide du logiciel de statistiques STATA 9 et avec l'aide d'un statisticien de l'Université de Lausanne.

Le premier article, intitulé "Sport Practice Among Adolescents With Chronic Health Conditions", est publié en juin 2009 dans la revue *Archives of Pediatrics and Adolescent Medicine*. Cette étude compare le niveau d'activité sportive entre les adolescents atteints d'affections chroniques et leurs pairs. L'hypothèse de recherche postule que les adolescents malades chroniques et/ou en situation de handicap pratiquent significativement moins de sport que les autres. Il ressort des analyses statistiques que cette hypothèse n'est vérifiée que si l'on considère les adolescents de sexe masculin. En effet, l'étude montre également que les filles de 16 à 20 ans en général pratiquent significativement moins de sport que leurs pairs masculins. Et le fait d'être atteint d'une affection chronique semble ne pas représenter chez elles un facteur de risque supplémentaire de diminution de la pratique sportive. Dans ce même article, nous traitons également des éléments perçus par les adolescents comme des barrières à la pratique sportive. Il s'avère que les adolescents atteints d'affections chronique ne perçoivent pas leur maladie ou leur situation de handicap comme la principale raison de leur faible activité sportive. Ils évoquent plus fréquemment un manque de temps libre ou une préférence pour d'autres activités, soit les mêmes barrières que celles évoquées par leurs pairs. Les conclusions de cette étude doivent rappeler aux professionnels de la santé l'importance d'encourager la pratique sportive chez leurs jeunes patients, particulièrement ceux atteints d'affections chroniques ainsi que les adolescentes en général.

Dans le second article, intitulé "Are Adolescents With Chronic Conditions Particularly at Risk of Bullying?", il est question de violence entre adolescents. Plus précisément, nous étudions la prévalence de *bullying* chez les adolescents atteints d'affections chroniques et leurs pairs. Le terme de *bullying*, volontairement emprunté à l'Anglais, représente un phénomène complexe, que l'on peut approximer en Français comme une victimisation par les pairs en milieu scolaire. Il résulte de cette étude que le fait d'être atteint d'une affection chronique semble être un facteur de risque significatif de *bullying* chez les adolescents de 16 à 20 ans. Cette conclusion amène à considérer le problème du *bullying* dans l'intégration des élèves malades chroniques et en situation de handicap dans le système scolaire principal, notamment par la mise en place de mesures de prévention. Cet article est publié en ligne par la revue *Archives of Disease in Childhood* en mars 2009.

Sports Practice Among Adolescents With Chronic Health Conditions

Isabelle Pittet, MD; André Berchtold, PhD; Christina Akre, MA; Pierre-André Michaud, MD; Joan-Carles Suris, MD, MPH, PhD

Objectives: To compare the level of sports practice between adolescents with chronic health conditions (CHCs) and control peers and to examine the reasons given by adolescents with CHCs for not practicing any sports in comparison with the control group.

Design: School survey.

Setting: Postmandatory schools.

Participants: A total of 6790 students (3275 females) aged 16 to 20 years, grouped as adolescents with CHCs (355 females, 354 males) and control peers (2920 females, 3161 males).

Main Exposure: Chronic health condition was defined using a noncategorical approach including adolescents with a chronic disease and/or a physical handicap.

Main Outcome Measures: Sports practice, barriers to sports practice among individuals not practicing any sports, and biological, psychological, socioeducative, and physical activity characteristics.

Results: Males with CHCs were less likely than control males to practice sports, whereas no significant difference was observed for females. Chronically ill youth were significantly more likely to report having a CHC as a barrier for not practicing sports. However, the most frequently reported barrier was preference for other activities for males with CHCs and lack of time for control males and for females with and without CHCs.

Conclusions: Having a CHC seems to influence sports practice among males but not females. We recommend that practitioners dealing with adolescents remember to take into account sports practice as part of the care of young patients with CHCs.

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PHYSICAL ACTIVITY AND SPORTS practice are good for adolescents in terms of both somatic and mental health. There is evidence that regular physical activity decreases the risk of developing cardiovascular diseases, overweight, and type II diabetes and is important for skeletal development in the young, which may also prevent osteoporosis later in life.^{1,2} A positive effect on self-image and depression has also been described in adolescents.^{3,4}

Sports practice or physical exercise is also an important issue for adolescents with chronic health conditions (CHCs) in terms of improving health in particular diseases⁵⁻⁸ and on a psychosocial level by enhancing quality of life⁹ and expanding social networks through sports teams or clubs.^{10,11}

Few articles have been published on sports practice among adolescents with CHCs, and these most often consider physical activity in general rather than

sports practice. The literature mainly reports studies using clinical and mostly small samples^{12,13} or considering single diseases,¹³⁻¹⁷ and some do not have a control group or use reports of healthy youths from the literature for comparison.^{13-15,18} Moreover, the results are ambiguous overall as most of these studies show a tendency in chronically ill adolescents to be less physically active than their healthy counterparts,^{13,14,17-20} whereas some demonstrate no difference^{15,16} or even higher activity levels than peers.²¹

Previous studies have shown the influence of several factors on sports practice during adolescence, such as age and sex (sports practice declines with increasing age, especially among females²²), being overweight,²³ low socioeconomic status,^{22,24-26} living in a rural area,²² poor health perception, poor body image, and depression.²³ Academic track can also influence sports practice as students practice more sports than apprentices.²⁷ Belonging to a

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sports club also seems to be linked with higher sports participation.^{27,28} Furthermore, non-Swiss-born adolescent males seem to practice more sports than Swiss males, contrarily to females.²⁷ However, available literature about sports practice in adolescents with CHCs rarely takes any of these potential confounders into account except for age, sex,^{12-14,16,19,20} and sometimes body mass index^{12,14,20} or parents' education.¹⁹

The literature on reasons adolescents do not practice sports is also scarce, particularly among those with CHCs. To our knowledge, the literature about barriers to sports practice in CHCs is limited to a few specific diseases^{16,29} or to studies carried out among adults.^{30,31}

To fill these gaps, in this study we use a noncategorical approach to CHCs to compare the level of sports practice of adolescents with and without CHCs in a representative national sample. We also examine the reasons given by adolescents with and without CHCs for not practicing sports. We hypothesize the following: (1) adolescents with CHCs practice less sports than their healthy peers; and (2) the main barrier to sports practice reported by adolescents with CHCs is their condition.

METHODS

Data were collected from the Swiss Multicenter Adolescent Survey on Health 2002 database, a cross-sectional study conducted in Switzerland through a self-administered anonymous questionnaire within a representative national sample of 7548 adolescents aged 16 to 20 years attending postmandatory school. In Switzerland, after ending mandatory school by age 16 years, about one-third of adolescents enter high school (after which most students enter university), about two-thirds are enrolled as apprentices by companies to be trained for their future profession (these apprentices attend class at a vocational school 1 or 2 days per week), and about 10% interrupt or delay their education and therefore were not included in this study. The survey method has been described elsewhere.³² The study protocol was approved by the ethics committee of the University of Lausanne's Medical School.

From the 7548 individuals (3658 females) included in the Swiss Multicenter Adolescent Survey on Health 2002, we excluded 295 individuals with nonresponses to the questions about having a chronic disease and/or a physical handicap and another 94 with nonresponses to the question about sports practice. From the remaining, we also excluded 369 individuals with nonresponses to at least 1 covariable that was significant in a preliminary bivariate analysis. We compared excluded individuals with those included for age, academic track, sports practice, and physical activity by sex. There were no differences except for academic track (more apprentices among males and females excluded, data not shown). We controlled all of the analyses for academic track to reduce this possible bias. Our final sample included 3275 females and 3515 males.

We defined CHC using a noncategorical approach as described by Stein and Jessop³³ that considers chronically ill young people as one population rather than specific disease classes. This approach is based on the life experiences shared by young patients with a wide range of chronic health problems regardless of the given diseases. This global approach has been used by other investigators^{34,35} and can be justified in this study by the numerous publications indicating that different illnesses have a similar negative influence on sports participation.^{13,14,19,20,36-38}

The CHC group included 355 females and 354 males reporting a chronic disease ("Do you have a chronic disease,

that is to say a disease which lasts a long time (at least 6 months) and which may need regular care [eg, diabetes, scoliosis, etc]?" and/or a physical handicap ("Do you have a physical handicap, that is to say an injury which affects your body integrity and limits its functioning in any way?"). These prevalence figures (females, 10.8%; males, 10.1%) are in agreement with those in the literature.^{35,39} The control group included all adolescents who answered both questions negatively, that is, 2920 females and 3161 males. To assure the homogeneity of the CHC group, we performed preliminary analysis comparing the 3 possible subgroups (chronic disease, physical handicap, both) for age, academic track, sports practice, and physical activity by sex. The 3 subgroups showed no significant differences between them (data not shown). Additionally, as asthma could represent a large proportion of CHCs, we assessed how many subjects in the CHC group also answered "quite often or very often" to the question "Have you had respiratory problems in the last 12 months?" One hundred eighteen males (33.3%) and 129 females (36.3%) were included in this subgroup. We compared them with the rest of the CHC group for age, academic track, sports practice, and physical activity by sex and found no significant differences between them (data not shown).

DEPENDENT VARIABLE

Sports practice was assessed by the question "Do you practice any extracurricular sports?" The question had 4 possible answers: no (reference category), about once per week, 2 to 3 times per week, and daily or almost daily.

INDEPENDENT VARIABLES

We took a series of potential confounding factors to this relationship into account, namely biological, psychological, and socioeducative factors as well as the level of physical activity.

Biological factors included age (16-20 years) and being overweight. Overweight was assessed from the body mass index (calculated as weight in kilograms divided by height in meters squared from self-reported data on weight and height) using the cutoffs for age described by Cole et al.⁴⁰

For psychological factors, health perception was assessed by the question "Do you think your health is excellent, very good, good, mediocre, or poor?" and was dichotomized into good (good to excellent) and poor (mediocre or poor). Body image was assessed by the statement "I am satisfied with my body" (yes or no). Depression was assessed with the Depressive Tendencies Scale with scores graduated from 0 (low) to 3 (high) and including 8 items about feelings of sadness, hopelessness, and unhappiness. This scale has proven to be a valid and reliable instrument.^{41,42} In this study, Cronbach α was 0.89.

Socioeducative factors included academic track (student or apprentice), nationality (Swiss-born or not), family structure (parents living together or not), place of residence (urban or rural), belonging to a sports club (yes or no), school grades (good or poor), and socioeconomic status. Socioeconomic status was assessed using the parents' education level as a proxy measure. Approximation of socioeconomic status by the parents' education level is supported in several publications.^{43,44} We dichotomized the mother's and father's education level into low (mandatory school or less) and high (more than mandatory school). We created a new variable called *parents' education level* that had 3 categories: low education level of both parents, low education level of 1 parent, and high education level of both parents (reference category).

The level of physical activity was evaluated using an ordinal scale from 0 to 7 days per week assessed by the question

Table 1. Bivariate Analysis by Sex

Characteristic	Females, % (95% CI)		Males, % (95% CI)	
	CHC (n=355)	Control (n=2920)	CHC (n=354)	Control (n=3161)
Age, y ^a	17.9 (17.7-18.1)	17.8 (17.7-17.9)	18.3 (18.0-18.6)	17.9 (17.8-18.0)
Overweight	10.0 (6.9-14.2)	8.2 (5.2-12.7)	15.6 (10.7-22.2)	13.3 (11.7-15.0)
Poor health perception	17.3 (13.2-22.4)	4.6 (3.7-5.6)	10.6 (7.4-15.1)	5.2 (4.0-6.7)
Negative body image	40.5 (34.5-46.7)	26.4 (23.4-29.6)	19.6 (11.9-30.5)	13.6 (11.5-15.9)
Depression Tendencies Scale score ^b	1.0 (0.9-1.1)	0.8 (0.7-0.8)	0.8 (0.7-0.9)	0.5 (0.5-0.6)
Apprentice	57.2 (49.3-64.7)	63.4 (57.1-69.0)	77.4 (70.2-83.3)	78.0 (73.6-81.9)
Parents' education				
Both high	76.5 (71.6-80.9)	73.5 (70.6-76.2)	80.8 (73.9-86.3)	72.6 (69.8-75.2)
1 Low	15.8 (12.1-20.3)	15.8 (14.0-17.8)	13.2 (8.8-19.5)	16.8 (14.3-19.5)
Both low	7.7 (5.3-11.1)	10.7 (8.8-13.0)	6.0 (3.1-11.0)	10.7 (9.1-12.5)
Non-Swiss-born	9.8 (7.1-13.4)	10.9 (9.3-12.7)	9.2 (5.3-15.5)	12.2 (10.5-14.2)
Parents not living together	23.6 (18.9-29.0)	22.2 (19.7-24.5)	23.2 (17.3-30.3)	20.9 (18.8-23.2)
Rural residence	57.0 (51.1-62.8)	58.2 (53.6-62.3)	49.8 (40.8-58.7)	57.8 (54.1-61.4)
Not belonging to sports club	61.0 (55.1-66.7)	61.8 (58.0-65.4)	58.2 (49.9-66.1)	46.5 (43.1-50.0)
Poor school grades	22.8 (18.6-27.6)	21.2 (18.5-24.2)	20.1 (14.9-26.5)	23.5 (21.1-26.1)
Physical activity, d/wk ^a	2.7 (2.5-2.9)	2.8 (2.7-3.0)	3.4 (3.1-3.7)	3.8 (3.7-4.0)
Sports activity				
None	35.6 (30.4-41.1)	29.7 (26.7-33.0)	31.3 (24.8-38.6)	19.2 (16.9-21.6)
1 Time/wk	26.0 (21.1-31.6)	29.3 (27.1-31.5)	19.0 (14.1-25.0)	20.0 (17.7-22.5)
2-3 Times/wk	28.8 (24.1-34.1)	30.9 (28.8-33.1)	35.0 (25.2-46.2)	40.8 (38.4-43.3)
Daily or almost daily	9.7 (6.5-14.1)	10.1 (8.2-12.4)	14.8 (10.7-20.2)	20.1 (18.1-22.2)

Abbreviations: CHC, chronic health condition; CI, confidence interval.

^a Expressed as mean (95% CI).

^b Scale is scored from 0 (low) to 3 (high); values are expressed as mean (95% CI).

"During the last week, how many days did you engage in physical activity over a period of at least 20 minutes and making you sweat or breathe heavily?" as described by Sallis et al.⁴⁵

Finally, those declaring that they were not practicing sports were also asked to answer a specific question about the barriers to sports practice. Twelve possibilities were listed and more than 1 answer was possible: I have an injury or physical handicap; I feel ill at ease with my body; I am not gifted; I do not like sports; I have an irregular work schedule; I already have a physically demanding job; I do not have time; there are not enough facilities or sports clubs; I am lazy; I prefer other activities; my friends do not practice sports either; or other.

STATISTICAL ANALYSIS

All of the analyses were conducted separately by sex because there is evidence that females tend to practice less sports than males.²² In a first step, we performed a bivariate analysis to compare the 2 groups. We used χ^2 tests to analyze categorical data and *t* tests for continuous data. Results are given as prevalences or means with 95% confidence intervals.

All of the significant variables in the bivariate analysis were considered possible explanatory factors in a binary logistic regression comparing the CHC and control groups. We also controlled for age and academic track even if these were not significant in bivariate analyses because these are important potential confounders. Standard procedures for automatic variable selection in regressions such as backward and stepwise selection are known to produce unstable and nonreproducible results,⁴⁶ so we selected important factors using a bootstrap procedure. Ten thousand bootstrap samples were generated for females and for males, and a backward selection procedure was applied on each of them. Explanatory factors retained in at least 60% of the replications were selected for inclusion in the final model.⁴⁷ Results are given as adjusted odds ratios (AORs) using the control group as the reference category.

In a second step, we performed analyses using only individuals reporting no sports practice (1076 females [139 with CHCs and 937 control peers] and 745 males [112 with CHCs and 633 control peers]). First, we looked for the prevalence (with 95% confidence interval) of each of the 12 barriers in both groups. To highlight potential confounders, we repeated a bivariate analysis of all variables in step 1 comparing individuals in both groups who reported no sports practice. All of the significant variables in the bivariate analysis were included in logistic regressions analyzing each barrier independently. We did not perform a variable selection in the regressions so that we could use the same model for each barrier. Results are given as AORs using the control group as the reference category.

We used Stata version 9.2 statistical software (StataCorp LP, College Station, Texas) for most analyses because this software allows for computing coefficient estimates and variances taking into account the sampling weights, clustering, and stratification procedure of the Swiss Multicenter Adolescent Survey on Health 2002. We used MATLAB 7 (MathWorks, Inc, Natick, Massachusetts) for the bootstrap variable selection procedure.

RESULTS

SPORTS PRACTICE AND CHC

Bivariate analysis showed that females with CHCs were significantly more likely than control females to show a poor health perception, a negative body image, and a high depression level. Sports practice did not reach significance at the bivariate level (**Table 1**) and remained non-significant in the multivariate regression taking into account potential confounders (**Table 2**).

In the bivariate analysis, males with CHCs were significantly less likely than control males to practice sports,

Table 2. Detailed Results of Multivariate Analysis of Levels of Sports Practice by Sex

Sports Practice	CHC vs Control, AOR (95% CI)	
	Females ^a	Males ^b
None	1 [Reference]	1 [Reference]
1 Time/wk	0.85 (0.61-1.20)	0.61 (0.41-0.89)
2-3 Times/wk	0.92 (0.69-1.23)	0.57 (0.34-0.94)
Daily or almost daily	0.98 (0.61-1.57)	0.56 (0.37-0.87)

Abbreviations: AOR, adjusted odds ratio; CHC, chronic health condition; CI, confidence interval.

^aControlled for age, academic track, depression, health perception, and body image.

^bControlled for age, academic track, physical activity, depression, health perception, and belonging to a sports club.

to have a high level of physical activity, and to belong to a sports club, and they were more likely to be older, to have a poor health perception, and to have a high depression level (Table 1). In the multivariate regression, males with CHCs were less likely than control males to practice sports daily or almost daily (AOR=0.56), 2 to 3 times per week (AOR=0.57), or once per week (AOR=0.61) after controlling for potential confounders (Table 2).

BARRIERS TO SPORTS PRACTICE

The bivariate analysis including only individuals not practicing any sports showed that females with CHCs were significantly more likely than control females to have a poor health perception and a negative body image, whereas males with CHCs reported significantly better school grades than control males (Table 3).

As for barriers to sports practice, females with CHCs were significantly more likely than control females to report having an injury or physical handicap, feeling ill at ease with their body, and already having a physically demanding job and less likely to report preferring other activities in the bivariate analysis. When controlling for possible confounding variables, the difference remained significant only for having an injury or physical handicap (AOR=10.79), having a physically demanding job (AOR=2.26), and preferring other activities (AOR=0.62). It is worth noting that, although not significant, the most frequently reported barrier is lack of time for both females with CHCs (54.4%) and control females (61.5%) (Table 4).

Among males, when comparing each barrier individually, the CHC group was significantly more likely than the control group to report having an injury or physical handicap as a barrier to sports practice. This was also the only significant barrier in the multivariate analysis (AOR=15.61). The most frequently reported barrier was preference for other activities for the CHC group (47.8%) and lack of time for control males (48.7%) (Table 5).

COMMENT

Our findings indicate that contrarily to females, adolescent males with CHCs practice less sports than their peers,

confirming our first hypothesis concerning males only. Contrarily to our second hypothesis, CHCs do not appear to be the main barrier to sports practice among adolescents with CHCs.

In our study, CHCs seem to have little influence on sports practice among females. A possible explanation is that there is evidence adolescent females in general practice less sports than males.^{18,22,24,48-50} Similarly, our results do not show any negative effect of CHCs on females' physical activity either. On the other hand, males with CHCs in our study have a significantly lower weekly physical activity level compared with their peers. A positive correlation between physical activity and sports practice has already been shown,²⁸ which our findings seem to confirm.

In fact, our results show a negative influence of CHCs on sports practice among males as described in the literature.⁵¹ Health conditions probably make it more difficult for youths to practice sports not only because of physical impairment but also because of the requirements of their treatment. Furthermore, sports in late adolescence become very competitive, leaving few opportunities to practice sports in a noncompetitive way.⁵² Thus, the less competitive youths or those who have less time available for sports practice drop out earlier.⁵² This might be the case for adolescents having a condition with even little effect on leisure physical activity. Moreover, males who are good at sports can dream of a professional sports career,⁵³ which stimulates them to practice more sports. This is much less the case for chronically ill males because they might be less competitive.

Our findings indicate that having a CHC plays the role of a barrier to sports practice for both males and females with CHCs. However, it is not the most commonly cited barrier among adolescents with CHCs. The most frequently reported barriers among males and females are lack of time and preference for other activities. Nowadays, there is such a wide choice of possible leisure activities that sports practice should become more attractive in competing with such activities. There is evidence that enjoyment of sports and physical activity decreases with age in adolescents.⁵⁴ Females frequently prefer activities other than sports practice, which is often considered as different from stereotypical feminine concepts in Western societies.^{49,50} Additionally, high-level sports for women remain insufficiently regarded and socially supported compared with sports for men.^{49,53} Thus, there is a need to promote the fun and informal side of sports practice, making it more attractive to females as well. Another major problem is raised by the fact that in this study, most adolescents with and without CHCs report not having enough time to include sports practice in their daily life. This finding is supported in the literature^{28,55} and seems to be a difficult barrier to overcome. Adolescents now have heavy schedules, and unfortunately sports practice is often the first leisure activity to be dropped, especially in the case of poor grades at school when adolescents need to spend more time studying.

Our results also show that significantly more females with CHCs than control females report uneasiness about their body as a reason for not practicing sports. This might be related to their health condition: females with CHCs

Table 3. Bivariate Analysis by Sex for Individuals Not Practicing Sports

Characteristic	Females, % (95% CI)		Males, % (95% CI)	
	CHC (n=139)	Control (n=937)	CHC (n=112)	Control (n=633)
Age, y ^a	18.0 (17.8-18.2)	18.0 (17.8-18.1)	18.3 (18.0-18.6)	18.0 (17.8-18.2)
Overweight	10.1 (5.7-17.2)	7.9 (5.9-10.4)	19.3 (11.5-30.6)	14.2 (10.9-18.2)
Poor health perception	23.3 (16.4-31.9)	8.3 (6.5-10.7)	15.1 (9.3-23.8)	9.0 (6.8-11.9)
Negative body image	40.5 (36.2-55.1)	30.1 (26.6-33.8)	28.6 (16.7-44.4)	18.1 (14.7-22.0)
Depression Tendencies Scale score ^b	1.1 (0.9-1.3)	0.9 (0.9-1.0)	0.6 (0.5-0.8)	0.7 (0.6-0.8)
Apprentice	58.2 (47.8-67.9)	67.1 (60.5-73.2)	75.8 (65.3-83.8)	82.3 (77.1-86.4)
Parents' education				
Both high	73.9 (64.9-81.3)	66.3 (62.2-70.1)	83.4 (72.7-90.4)	70.9 (65.9-75.5)
1 Low	17.0 (11.1-25.3)	17.7 (14.7-21.0)	10.1 (5.1-19.2)	16.1 (12.7-20.3)
Both low	9.1 (5.2-15.4)	16.1 (12.7-20.2)	6.5 (2.5-15.9)	13.0 (9.8-17.0)
Non-Swiss-born	13.5 (8.5-20.6)	17.4 (13.9-21.5)	6.5 (3.3-12.2)	10.6 (7.8-14.2)
Parents not living together	28.2 (20.6-37.3)	26.5 (22.8-30.6)	25.5 (16.5-37.2)	27.1 (22.3-32.4)
Rural residence	55.6 (46.8-64.1)	51.7 (47.6-55.8)	48.7 (36.0-61.6)	59.1 (53.8-64.2)
Not belonging to sports club	90.8 (84.4-94.7)	93.6 (91.5-95.2)	91.2 (83.7-95.4)	93.2 (90.6-95.1)
Poor school grades	23.9 (17.2-36.9)	31.3 (26.2-36.9)	18.4 (11.5-28.1)	31.9 (25.8-38.7)
Physical activity, d/wk ^a	1.8 (1.5-2.1)	1.8 (1.6-1.9)	2.3 (1.9-2.8)	2.7 (2.4-3.0)

Abbreviations: CHC, chronic health condition; CI, confidence interval.

^a Expressed as mean (95% CI).

^b Scale is scored from 0 (low) to 3 (high); values are expressed as mean (95% CI).

Table 4. Bivariate and Multivariate Analyses Performed for Each Barrier Independently Among Females With Chronic Health Conditions and Control Females Not Practicing Sports

Barrier	Bivariate Analysis, % (95% CI)		Multivariate Analysis, AOR (95% CI) ^a
	CHC (n=139)	Control (n=937)	
Injury or physical handicap	36.3 (28.4-45.0)	4.8 (3.4-6.7)	10.79 (6.55-17.78)
Not at ease with body	13.3 (8.3-20.8)	5.6 (4.2-7.3)	1.71 (0.92-3.18)
Not gifted	10.6 (6.2-17.5)	8.6 (6.6-11.3)	0.92 (0.45-1.90)
Does not like sports	18.9 (13.0-26.7)	25.5 (19.9-32.0)	0.72 (0.42-1.24)
Irregular work schedule	20.1 (14.1-27.8)	19.9 (16.6-23.7)	1.11 (0.69-1.80)
Physically demanding job	18.6 (12.4-26.8)	10.2 (7.6-13.4)	2.26 (1.25-4.06)
Lack of time	54.4 (45.3-63.1)	61.5 (56.7-66.1)	0.75 (0.51-1.11)
No occasion or club	12.4 (7.2-20.7)	9.3 (7.3-11.8)	1.28 (0.65-2.52)
Laziness	19.7 (13.4-28.1)	26.5 (22.9-30.3)	0.64 (0.38-1.08)
Preference for other things	27.3 (20.1-36.0)	38.9 (34.8-43.0)	0.62 (0.40-0.98)
Friends do not practice sports	6.8 (3.6-12.6)	5.6 (4.0-7.6)	1.33 (0.62-2.88)
Other	10.0 (5.8-16.7)	11.9 (9.6-14.5)	0.72 (0.38-1.39)

Abbreviations: AOR, adjusted odds ratio; CHC, chronic health condition; CI, confidence interval.

^a Controlled for age, health perception, body image, and academic track.

Table 5. Bivariate and Multivariate Analyses Performed for Each Barrier Independently Among Males With Chronic Health Conditions and Control Males Not Practicing Sports

Barrier	Bivariate Analysis, % (95% CI)		Multivariate Analysis, AOR (95% CI) ^a
	CHC (n=12)	Control (n=633)	
Injury or physical handicap	36.8 (26.4-48.8)	3.7 (2.4-5.7)	15.61 (8.90-27.40)
Not at ease with body	1.6 (0.5-5.0)	3.4 (1.9-6.0)	0.45 (0.12-1.78)
Not gifted	12.1 (6.2-22.1)	6.2 (4.5-8.6)	2.03 (0.91-4.52)
Does not like sports	25.4 (16.6-37.0)	22.8 (18.2-28.2)	1.21 (0.67-2.17)
Irregular work schedule	15.7 (9.4-25.1)	15.1 (11.9-18.9)	1.14 (0.61-2.14)
Physically demanding job	22.7 (14.4-33.8)	29.2 (23.7-35.4)	0.72 (0.37-1.40)
Lack of time	42.6 (31.7-54.2)	48.7 (43.6-53.9)	0.76 (0.43-1.32)
No occasion or club	8.3 (4.4-15.1)	6.2 (4.5-8.4)	1.36 (0.65-2.87)
Laziness	27.8 (16.5-42.9)	29.7 (25.0-34.9)	0.89 (0.41-1.94)
Preference for other things	47.8 (35.7-60.3)	43.3 (37.0-49.8)	1.30 (0.72-2.36)
Friends do not practice sports	7.3 (4.0-13.0)	8.5 (5.1-13.9)	1.03 (0.47-2.25)
Other	11.9 (7.1-19.4)	14.8 (11.4-19.0)	0.84 (0.45-1.55)

Abbreviations: AOR, adjusted odds ratio; CHC, chronic health condition; CI, confidence interval.

^a Controlled for age, academic track, and school grades.

appear to be less satisfied with their body,⁵⁶ and in our findings they report a more negative body image. Another significant barrier reported by females with CHCs

is having a physically demanding job, although females overall rarely choose physically demanding apprenticeships, contrarily to males. This finding probably indi-

cates that some CHCs make most jobs more tiresome for them. Control females appear to have significantly more preference for other activities, although this is also an issue among females with CHCs, this barrier being reported by 1 in 4 females in the CHC group.

The similarities in barriers to sports practice between adolescents with and without CHCs raised in this study seem to indicate that lifestyles of youths with CHCs and their peers might be more alike than is usually supposed, which has already been described for sexuality or substance use.³⁹

The main strength of our study is that to our knowledge this is the first study comparing sports practice among adolescents with and without CHCs using a nationally representative sample and controlling for potential confounders. This study also has several limitations. First, being a cross-sectional study, causality cannot be assumed. A second limitation is a possible response bias due to self-reported data. The literature suggests that a self-administered anonymous questionnaire encourages respondents to report the truth, especially about sensitive topics.⁵⁷⁻⁵⁹ Additionally, it is less likely that respondents will intentionally give incorrect answers about sports practice than about more sensitive subjects like sex or drugs. Third, no information about the severity of the conditions was included in the survey. However, the fact that we controlled for health perception should minimize this bias. Fourth, we do not have information about the kinds of sports that youth with CHCs perform, which could be less strenuous than those practiced by adolescents without CHCs. Finally, adolescents with CHCs unable to follow mainstream schooling (ie, mentally handicapped or severely physically disabled individuals) were not included in the survey, although they represent only a small percentage of the CHC population. However, there is a risk of excluding the most extreme cases of adolescents with CHCs, possibly making our findings slightly more optimistic than the reality.

In conclusion, our results indicate that males with CHCs practice significantly less sports than their male control peers. It would therefore be worth encouraging them to participate in sports activities by promoting the practice of sports for fun rather than for competition. On the other hand, having a CHC has little influence on sports practice for females, suggesting that recommendations to these females about sports practice should be the same as for other adolescent females.

From the point of view of health professionals, practitioners dealing with adolescents should remember to encourage sports practice as part of the care of young patients with CHCs at a level appropriate for each specific health problem. Further research should be undertaken to investigate factors that would promote sports practice among adolescent females in general and among males with CHCs in particular.

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Author Contributions: Study concept and design: Pittet, Berchtold, Michaud, and Surís. Acquisition of data: Michaud. Analysis and interpretation of data: Pittet, Berchtold, Akre, and Surís. Drafting of the manuscript: Pittet. Critical revision of the manuscript for important intellectual content: Berchtold, Akre, Michaud, and Surís. Statistical analysis: Pittet and Berchtold. Obtained funding: Michaud. Administrative, technical, and material support: Akre. Study supervision: Surís.

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October 16, 2008

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Are adolescents with chronic conditions particularly at risk of bullying?

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ARE ADOLESCENTS WITH CHRONIC CONDITIONS PARTICULARLY AT RISK OF BULLYING?

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Key words: Adolescence, bullying, chronic disease

Abstract

Objective: To compare the prevalence and intensity of victimization from bullying, and the characteristics of the victims of bullying, comparing adolescents with and without chronic conditions.

Design: School survey.

Setting: Post-mandatory schools.

Participants: A total of 7005 students (48% females) aged 16-20 years, distributed into adolescents with chronic conditions (728, 50% females) and controls (6277, 48% females). Chronic condition was defined as having a chronic disease and/or a physical disability.

Outcome measures: Prevalence of bullying; intensity of bullying; and socio-demographic, bio-psychosocial, familial, school, and violence context characteristics of the victims of bullying.

Results: The prevalence of bullying in our sample was 13.85%. Adolescents with chronic conditions were more likely to be victims of bullying (Adjusted Odds Ratio [AOR] 1.53), and to be victims of two or three forms of bullying (AOR 1.92). Victims of bullying with chronic conditions were more likely than non-victims to be depressed (Relative Risk Ratio [RRR] 1.57), to have more physical symptoms (RRR 1.61), to have a poorer relationship with their parents (RRR 1.33), to have a poorer school climate (RRR 1.60), and to have been victims of sexual abuse (RRR 1.79) or other forms of violence (RRR 1.80). Although these characteristics apply to victims in general, in most cases they are less pronounced among victims without chronic conditions.

Conclusions: Chronic conditions seem to be a risk factor for victimization from bullying. Therefore, as adolescents with chronic conditions are increasingly mainstreamed, schools should be encouraged to undertake preventive measures to avoid victimization of such adolescents.

INTRODUCTION

Bullying is defined as an aggressive behaviour, repeated over time, with the intention to harm the victim, and characterized by an imbalance of power between bully and victim.[1-3] Bullying involvement (being a bully, a victim or both) has been widely studied and prevalence vary with age and between countries.[2;4;5] There is evidence that bullying has adverse effects on victims' physical and psychosocial well-being, including school life.[2;3;5]

The phenomenon of bullying has been less studied among adolescents with chronic conditions (CC). To our knowledge, only a few papers have addressed this problem including all types of chronic diseases and disabilities, among representative samples.[6;7] In fact, most research has focused either on physical disabilities,[3;8] or on specific diseases,[9-11] using small clinical samples. Probably for these reasons, there is no uniformity in the results: although most studies show that CC youths tend to be at increased risk of victimization,[3;4;7] some found no indication that children with a visible health problem were more likely to be victims.[6;8;12]

Previous studies have shown an association between victimization from bullying and several factors, such as gender and age,[4;13] depression [2;6;14;15] and suicidal ideation,[15] low self-esteem,[2;3;14-16] body dissatisfaction,[16;17] being overweight [16;18;19] or taller than average,[16] poor health status or increased physical symptoms,[6;18] low socioeconomic status and non-intact families.[4;20] Low grades or unhappiness at school,[5;14;15] having fewer friends [14] or low quality friendships,[3] and violent behaviours [21;22] are also associated with bullying. Substance use seems to be linked with bullying, but the literature is not univocal about it.[5;14]

The objective of this study was to compare the prevalence and the intensity of victimization from bullying together with the characteristics of the victims of bullying between adolescents with CC and their healthy counterparts in a representative Swiss national sample. We hypothesized that CC adolescents would be more likely to be victims of bullying than their peers because of their different appearance or behaviour (e.g. checking blood glucose when diabetic, not attending physical education classes when disabled); would experience more intense bullying than victims without CC; and the characteristics of the victims would be different between adolescents with and without CC.

METHODS

Data were drawn from the Swiss Multicenter Adolescent Survey on Health 2002 (SMASH02) database. This cross-sectional study was carried out through a self-administered anonymous questionnaire among a representative national sample of 7548 adolescents aged 16-20 years, attending post-mandatory school. In Switzerland, mandatory school ends at age 16. Then, about one third of adolescents enter high school (which prepares students for university), about two thirds are enrolled as apprentices by companies for professional training (with class at a vocational school one or two days per week), and about 10% interrupt or delay their education and therefore were not included in this study. The methodology of the survey has been described elsewhere.[23] The study's protocol was approved by the Ethics Committee of the University of Lausanne's Medical School.

From the initial 7548 individuals (48% girls) included in SMASH02, we excluded altogether 543 individuals (49% girls): 295 with nonresponses to having a chronic disease and/or disability, 17 with nonresponses to bullying, and 231 with nonresponses to explanatory

variables. We compared included and excluded individuals for age, gender, and academic track. There were differences for academic track only (more apprentices among excluded individuals, data not shown). Therefore we controlled all analyses for academic track in order to reduce this possible bias. Our final sample included 7005 adolescents (48% girls).

The CC group included 728 adolescents (50% girls), who reported a chronic disease (*a disease which lasts at least 6 months and which may need regular care*) and/or a physical disability (*an injury which affects the body integrity and limits its functioning*). The prevalence of CC (10.4%) matches that found in the literature.[24;25] In order to assure the homogeneity of the CC group, we performed preliminary analysis comparing the three possible subgroups (chronic disease; disability; both) for gender, age, academic track, and bullying. There were no significant differences among the three subgroups (data not shown). The non-CC group included 6277 adolescents (48% girls).

Dependent variable

Bullying was assessed by the question "During the last year, have others..." (a) "made fun of you or insulted you?" (b) "attacked or ill-treated you?" (c) "excluded you intentionally or prevented you from participating?", representing three forms of bullying, respectively teasing, physical aggression, and social exclusion, according to Olweus' description.[2] Each item had four possible answers: "never", "once or twice", "about once a week" and "more often". Out of these three questions, we created a variable called *Bullying*, with two categories. The Victim category comprised individuals who experienced at least one form of bullying, about once a week or more (n = 908, 45% girls). All others were considered Non-victims (n = 6097, 49% girls).

In a second step, we measured the intensity of bullying, by examining how many of the three forms of bullying were experienced. This variable initially had 4 categories: "none", "1 form", "2 forms", and "3 forms of bullying". Because of very small proportions (0.27%) in the fourth category, we combined the last two into "2-3 forms of bullying".

Finally, in order to analyse the characteristics of the victims, we divided the sample into four groups, based on whether adolescents were victims of bullying, and whether they had a chronic condition: "Victims-CC" (n=140), "Victims-non-CC" (n=768), "non-Victims-CC" (n=588), and "non-Victims-non-CC" (control group, n=5509).

Independent variables

Socio-demographic factors: *gender*, *age* (16-20 years), *academic track* (student/apprentice), and socioeconomic status (*SES*). Parents' education was used as a proxy for SES, and was dichotomized into "low education of both parents" (mandatory school or less) and "high education of at least one parent" (beyond mandatory schooling)

Bio-psychosocial factors: *Overweight* was assessed with body mass index (calculated from self-reported data on weight and height), using the age cut-offs described by Cole et al.[26] Self-assessed *puberty* was categorized into advanced / on time / delayed, compared to adolescents of similar age. We also examined adolescents' *health perception* (good/poor) and *body dissatisfaction* (yes/no). *Depression* was measured with the Depressive Tendencies Scale, a validated instrument [27;28] graduated from 1 (low) to 4 (high) based on 8 items . In this study, Cronbach's alpha was .89. *Suicidality* was expressed as having attempted suicide in the last year (yes/no). *Physical symptoms* consisted of having had frequent headaches,

stomach-aches and/or sleeping problems in the last year. We also assessed *daily smoking* (yes/no), *drunkenness* (any episode in the last month), *cannabis use* (any use in the last month), *difficulties to make friends* (yes/no), and having a *friend to talk to* (yes/no). Finally, *peer relationships* was graduated from 1 (good) to 4 (poor), using the Inventory of Parent and Peer Attachment [29] (4 items, Cronbach's alpha .89).

Family factors: *Family structure* (non-intact/intact family) and *parent-adolescent relationship*. The quality of the *parent-adolescent relationship* was scaled from 1 (good) to 4 (poor), using five items from the Inventory of Parent and Peer Attachment [29] plus an item about adolescents' perception on how much their parents trusted them (Cronbach's alpha .85).

School factors: *School climate* was measured with a scale from 1 (good) to 4 (poor), based on 5 items used in earlier studies [30;31] (Cronbach's alpha .61). Other factors considered were *school grades* (good/poor) and *skipping school* (at least once a week).

Violence context factors: *having suffered sexual abuse* (yes/no), *having been a victim of violence* in the last year (scale from 1 (low) to 4 (high), based on 3 items about experiencing physical violence, racketeering or theft (Cronbach's alpha .62), *being afraid to be beaten by parents* (yes/no), *carrying a weapon in the last year* (yes/no).

Statistical analysis

In a first step, we compared the socio-demographic characteristics of the CC and non-CC groups. Results are given as prevalence with 95% confidence interval or medians and p-values (Table 1). Then, we computed the prevalence, as well as the unadjusted and adjusted odds ratio of bullying globally and for each form of bullying (teasing, aggression, exclusion). The intensity of bullying between CC and non-CC adolescents was also analysed (Table 2). Finally, we compared the distribution of the independent factors described above between the Victim-of-bullying and non-Victim groups (Table 3).

Standard procedures for automatic variable selection in regressions such as backward and stepwise selection are known to produce unstable and non-reproducible results.[32] Thus we selected important explanatory factors to the relation between CC and bullying using a bootstrap procedure. Ten thousand bootstrap samples were generated and a backward selection procedure was applied on each of them, starting from a model including all the independent factors described above. Explanatory factors retained in at least 60% of the replications were included [33] in a multinomial regression. We compared the Victim-CC and Victim-non-CC groups with the non-Victim-non-CC (control) group. Besides the explanatory factors retained from the bootstrap procedure, we also controlled for age and academic track, because these are significant confounders. Results are given as relative risk ratios (RRR) with 95% confidence interval, using the control group as the reference category (Table 4).

We used STATA 9.2 for most analyses, as it allows computing coefficient estimates and variances taking into account the sampling weights, clustering and stratification procedure. Chi-square tests were used for categorical data and Mann-Whitney test for numerical data as the variables did not follow a normal distribution. MATLAB7 was used for the bootstrap variable selection procedures.

RESULTS

Overall, CC adolescents were significantly older, and less likely to have a low SES than non-CC. (Table 1)

The overall prevalence of bullying in our sample was 13.85% (teasing 12.53%, physical aggression 2.12%, social exclusion 1.59%), and this was significantly higher among CC adolescents (18.61%) than among controls (13.32%; $p < .01$). Even when controlling for possible confounders, CC youths remained significantly more likely to be victims of bullying, teasing, and social exclusion, and to experience one or more forms of bullying. Bullying in form of physical aggression, even though slightly higher, did not reach significance. (Table 2)

The bivariate analysis showed that most explanatory variables were significantly more frequent among victims of bullying. The only factors not reaching significance, were daily smoking, cannabis use, and skipping school. (Table 3)

The multinomial regression revealed that both victim groups were significantly more likely to have a poor health perception and physical symptoms, a high level of depression, difficulties to make friends, to be dissatisfied with their body, to experience high levels of violence, and to have been sexually abused. These characteristics were more pronounced in the Victim-CC group than among Victims-non-CC, except for difficulties to make friends and being a victim of violence. (Table 4)

DISCUSSION

In this study, almost one out of seven adolescents report having been bullied, and the prevalence increases to almost one out of five among CC youths, indicating that chronically ill adolescents are more likely than their peers to be victims of bullying. This might be due to a difference in physical appearance or behaviour induced by their condition or its management. CC adolescents also appear to experience more than one form of peer victimization, which can be interpreted as more intense bullying. These findings confirm our first and second hypotheses. Nevertheless, it is interesting to note that there is no difference between groups regarding physical exclusion.

The greatest difference between forms of bullying experienced by CC and healthy adolescents lies in social exclusion. In this study, CC adolescents are almost three times as likely as healthy peers to suffer exclusion. Previous research has shown a more limited social integration of adolescents with chronic conditions,[34;35] who were more likely to have fewer friends and lower levels of friend-support. Helgeson et al. suggest that the self-care needed to manage illnesses like diabetes might restrict social activities and interfere with the development of close relationships with peers, and in turn, negative social interactions might lead to poorer management of the disease.[35] Besides, there is evidence that good quality friendships are a protective factor against bullying,[36] making this situation of social exclusion a vicious circle.

However, CC victims in this study are slightly less likely than other victims to have difficulties to make friends and to be exposed to high levels of violence. Physical illness might represent a protective factor against victimization, as it might be socially more acceptable to bully those with psychological fragility than those with physical problems, who are less capable of defending themselves.[6;12] Bullied CC adolescents might induce more compassion than psychologically weak youths, thus making peers act more friendly with them. There is also evidence that young people targeted by bullies for other reasons than physical differences, are mainly those with poor social interactions and submissive

behaviours,[3;12] which, independently from bullying, may lead to difficulties to make friends.

Our findings also show that victims, regardless of their health status, are overall more likely to present with a greater amount of somatic and psychological complaints, more troubled relationships with parents, a poorer school climate, and are surrounded by a greater violence context, including sexual abuse. The victims thus display quite similar characteristics, whether or not they have a CC, and the coexistence of such features in the context of bullying is supported in the literature.[6;14;16;21] However, these features are more pronounced among CC victims than non-CC ones, and seem to indicate that having a CC can potentiate the effects of bullying. A possible explanation is the higher prevalence of body dissatisfaction and depression induced by the presence of chronic conditions,[37] that might add to the occurrence of such complaints in association with bullying. Similarly, the poorer health perception and higher amount of physical symptoms observed among CC victims can be interpreted as expressions of the underlying health condition.

The main strength of our study is that, to our knowledge, this is the only study comparing bullying between adolescents with and without CC, using a nationally representative sample, and examining features of overall somatic and psychosocial health between ill and healthy victims.

However, this study has some limitations. First, the cross-sectional setting allows no causality considerations. A second limitation is a possible response bias due to self-reported data, though anonymous self-administered questionnaires have been shown to be quite reliable.[38;39] Third, no information about the severity of the condition was obtained from the questionnaire. However the fact that we controlled for health perception should minimize this bias. Fourth, we have no data on youth not integrated in the school system, and further research is needed on that specific group of adolescents. Finally, the questionnaire gives no information about the perpetrators of bullying, allowing no analysis of this side of the problem in our sample.

In conclusion, bullying is probably more prevalent than supposed, especially among adolescents with chronic conditions. They are not only more likely to be victims than their peers, but they also experience more intense bullying than victims without CC. Besides, having a CC seems to potentiate the effects of bullying. From that point of view, it is important that health practitioners do not forget to discuss the issue of bullying when dealing with chronically ill young people. Furthermore, there is currently a positive trend towards promoting the integration of CC youths into mainstream schools, in order to improve their socialization. To ensure the success of such procedures, they should be applied cautiously and, in view of a relative intolerance of children to those who are different, some attendant measures should be planned to prevent victimization of CC youths in schools.

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Competing interests

None.

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What is already known on this topic

Bullying is an aggressive behaviour, repeated over time, with the intention to harm the victim. The prevalence of bullying is greater among boys and decreases with age during adolescence. It is associated with poorer health status and psychological distress.

What this study adds

Adolescents with chronic conditions are more likely than controls to be victims of bullying. When they are bullied, they are more likely to be victims of two or three different forms of bullying. Having a chronic condition seems to potentiate the harmful effects of bullying.

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Table 1. Socio-demographic characteristics of the CC and Non-CC samples *

	CC (n = 728)	Non-CC (n = 6277)	p
Gender: male	56.42 % [50.25 / 62.41]	53.92 % [49.78 / 58.00]	.42
Age †	18	18	<.001
Academic track: apprentice	68.30 % [61.95 / 74.04]	71.27 % [66.54 / 75.58]	.23
SES: Low SES both parents	6.45 % [4.43 / 9.30]	10.16 % [8.91 / 11.57]	.020

CC, chronic condition; SES, socioeconomic status

* Prevalence [95% Confidence intervals]

† Expressed as medians. P-value computed from a Mann-Whitney test.

Table 2. Bivariate analysis (prevalence, means, and unadjusted odds ratio [95% confidence intervals]) and multivariate (adjusted odds ratio [95% confidence intervals]) analyses of victimization from bullying between CC and non-CC *

	CC (n = 728)	Non-CC (n = 6277)	p	Odds Ratio	Adjusted Odds Ratio †
Victim of bullying	18.61 % [15.11 / 22.70]	13.32 % [11.91 / 14.87]	.001	1.41 [1.07 / 1.87]	1.53 [1.25 / 1.87]
Forms of bullying					
- Teasing	16.69 % [13.36 / 20.65]	12.07 % [10.72 / 13.57]	.017	1.41 [1.05 / 1.90]	1.46 [1.18 / 1.80]
- Physical aggression	2.55 % [1.60 / 4.05]	2.07 % [1.61 / 2.67]	.45	1.12 [0.64 / 1.95]	0.93 [0.51 / 1.71]
- Social exclusion	3.63 % [2.34 / 5.60]	1.36 % [1.06 / 1.74]	< .001	2.71 [1.63 / 4.48]	2.76 [1.80 / 4.22]
Intensity of bullying					
- 0 form of bullying	80.62 % [76.62 / 84.07]	85.38 % [83.79 / 86.85]		1.00 -	1.00 -
- 1 form of bullying	14.16 % [11.16 / 17.81]	11.64 % [10.32 / 13.10]	.008	1.52 [1.22 / 1.89]	1.40 [1.12 / 1.74]
- 2- 3 forms of bullying	5.22 % [3.66 / 7.40]	2.98 % [2.45 / 3.61]		2.16 [1.52 / 3.05]	1.92 [1.34 / 2.74]

CC, chronic condition

* Significant unadjusted and adjusted odds ratio are presented in boldface font

† Adjusted for Gender, Age, Academic track, Health perception

Table 3. Comparison of explanatory factors between the victims and non-victims groups*

	Victims (n = 908)	Non-victims (n = 6097)	P
Chronic conditionC	13.32 % [10.67 / 16.52]	9.37 % [8.17 / 10.72]	.001
Bio-psychosocial factors			
Overweight	13.63 % [10.80 / 17.05]	10.16 % [8.46 / 12.15]	.034
Puberty:			
- on time	48.41 % [43.53 / 53.31]	57.21 % [54.92 / 59.46]	< .001
- advanced	27.39 % [23.32 / 31.88]	27.13 % [25.19 / 29.16]	
- delayed	24.20 % [19.28 / 29.91]	15.66 % [13.91 / 17.60]	
Poor health perception	11.83 % [9.48 / 14.67]	4.64 % [3.98 / 5.40]	< .001
Body dissatisfaction	31.23 % [26.90 / 35.91]	18.71 % [17.07 / 20.46]	< .001
Depression (1-4) †	1.88	1.38	< .0001
Suicidality	6.18 % [4.04 / 9.34]	1.71 % [1.36 / 2.13]	< .001
Physical symptoms	53.70 % [48.32 / 59.00]	40.18 % [37.91 / 42.50]	< .001
Daily smoking	34.44 % [29.74 / 39.47]	31.18 % [28.76 / 33.71]	.25
Alcohol misuse	33.98 % [29.72 / 38.51]	28.89 % [26.66 / 31.23]	.026
Cannabis use	36.78 % [32.14 / 41.68]	33.03 % [30.80 / 35.34]	.15
Difficulties to make friends	18.01 % [13.13 / 24.21]	6.96 % [5.93 / 8.14]	< .0001
No friend to talk to	8.07 % [6.16 / 10.50]	5.57 % [4.85 / 6.39]	.011
Peer relationships (1-4) ‡	1.50	1.50	< .001
Family factors			
Non-intact family	29.52 % [25.90 / 33.41]	22.49 % [20.93 / 24.13]	< .001
Parent-adolescent relationship (1-4) ‡	1.83	1.50	< .0001
School factors			
School climate (1-4) ‡	2.20	2.00	< .0001
Bad school grades	27.90 % [24.17 / 31.96]	21.63 % [19.76 / 23.62]	.001
Skipping school	5.02 % [3.54 / 7.08]	5.18 % [4.21 / 6.36]	.86
Violence context factors			
Victim of violence (1-4) †	1.00	1.00	< .0001
Sexual abuse	10.73 % [8.43 / 13.57]	6.84 % [5.25 / 8.85]	.012
Afraid to be beaten by parents	15.13 % [12.26 / 18.53]	9.23 % [8.20 / 10.38]	< .001
Carrying a weapon	20.82 % [17.51 / 24.56]	11.59 % [10.25 / 13.08]	< .001

* Prevalence [95% Confidence intervals] of Victims of bullying vs. Non-Victims

† Scales from 1 (low) to 4 (high), expressed as medians. P-value computed from a Mann-Whitney test.

‡ Scales from 1 (good) to 4 (poor), expressed as medians. P-value computed from a Mann-Whitney test.

Table 4. Multinomial regression of the characteristics of the victims, compared to non-victims-non-CC (reference group) *†‡

	Victims-non-CC (n = 768) (Relative Risk Ratio)		Victims-CC (n = 140) (Relative Risk Ratio)	
<u>Socio-demographic factors</u>				
Gender: male	1.43	[1.18 / 1.72]	1.80	[1.19 / 2.71]
Age	0.94	[0.87 / 1.00]	1.01	[0.87 / 1.17]
Academic track: apprentice	0.99	[0.83 / 1.18]	1.24	[0.85 / 1.80]
SES: low SES both parents	0.59	[0.44 / 0.80]	0.34	[0.15 / 0.79]
<u>Bio-psychosocial factors</u>				
Puberty:				
- on time	1.00		1.00	
- advanced	0.75	[0.61 / 0.92]	0.52	[0.33 / 0.81]
- delayed	0.65	[0.51 / 0.82]	0.67	[0.42 / 1.06]
Poor health perception	1.70	[1.26 / 2.29]	3.42	[2.14 / 5.46]
Body dissatisfaction	1.43	[1.19 / 1.73]	1.85	[1.26 / 2.72]
Depression (high)	1.34	[1.18 / 1.52]	1.57	[1.21 / 2.04]
Suicidality	0.94	[0.60 / 1.47]	1.46	[0.73 / 2.94]
Physical symptoms	1.22	[1.02 / 1.46]	1.61	[1.08 / 2.41]
Cannabis use	0.76	[0.63 / 0.91]	0.90	[0.62 / 1.30]
Difficulties to make friends	1.98	[1.56 / 2.52]	1.73	[1.06 / 2.80]
<u>Family factors</u>				
Non-intact family	1.25	[1.04 / 1.49]	1.23	[0.84 / 1.81]
Parent-adolescent relationship (poor)	1.26	[1.11 / 1.44]	1.33	[1.02 / 1.73]
<u>School factors</u>				
School climate (poor)	1.47	[1.24 / 1.74]	1.60	[1.13 / 2.27]
Bad school grades	0.97	[0.81 / 1.17]	0.61	[0.40 / 0.93]
<u>Violence context factors</u>				
Victim of violence (high)	2.21	[1.76 / 2.78]	1.80	[1.17 / 2.76]
Sexual abuse	1.46	[1.09 / 1.96]	1.79	[1.04 / 3.10]
Carrying a weapon	1.65	[1.32 / 2.05]	1.33	[0.83 / 2.15]

CC, chronic condition; SES, socioeconomic status

* Variables selected from bootstrap regressions, + academic track and age)

† Relative Risk Ratio [95% Confidence intervals] of Victims – non-CC and Victims – CC

‡ Significant relative risk ratio are presented in boldface font

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CONDITIONS
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