Author Manuscript
Faculty of Biology and Medicine Publication

Health-risk behaviors and quality of life among young men

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ABSTRACT

Purpose: To examine the associations between substance use and other health-risk behaviors and quality of life among young men.

Methods: The analytical sample consisted of 5,306 young Swiss men who participated in the *Cohort Study on Substance Use Risk Factors* (C-SURF). Associations between seven distinct self-reported health-risk behaviors (risky single-occasion drinking; volume drinking; cigarette smoking; cannabis use; use of any other illicit drugs; sexual intercourse without a condom; low physical activity) were assessed via chi-square analysis. Logistic regression analyses were conducted to study the associations between each particular health-risk behavior and either physical or mental quality of life (assessed with the SF-12v2) while adjusting for socio-demographic variables and the presence of all other health-risk behaviors.

Results: Most health-risk behaviors co-occurred. However, low physical activity was not or negatively related to other health-risk behaviors. Almost all health-risk behaviors were associated with a greater likelihood of compromised quality of life. However, sexual intercourse without a condom (not associated with both physical and mental quality of life) and frequent risky single-occasion drinking (not related to mental quality of life after adjusting for the presence of other health-risk behaviors; positively associated with physical quality of life) differed from this pattern.

Conclusions: Health-risk behaviors are mostly associated with compromised quality of life. However, sexual intercourse without a condom and frequent risky single-occasion drinking differ from this pattern, and are therefore possibly particularly difficult to change relative to other health-risk behaviors.

KEYWORDS: quality of life; binge drinking; smoking; cannabis; physical activity; unsafe sex

INTRODUCTION

Health-risk behaviors, such as substance use, are quite common among adolescents and young adults, often co-occur [1-4], and can have various negative health-related consequences, up to premature death [5; 6]. Besides morbidity and mortality, associations between health-risk behaviors and subjective indicators like *quality of life (QOL)* should be considered. Such an approach provides insights into the reasons behind a person partaking in particular health-risk behaviors or about the perceived positive and negative associations of such behaviors (e.g., if a health-risk behavior is related to positive QOL, it is possible that this behavior is reinforced).

Existing investigations mostly indicate that health-risk behaviors are associated with compromised QOL. This has repeatedly been demonstrated for *(at-risk) alcohol consumption* [4; 7-12], *smoking tobacco* [4; 8; 10-19], and the *use of some illicit drugs* [4; 11; 13; 20; 21] as well as for *unsafe sexual behaviors* [4; 12; 22] and *limited physical activity* [8; 10; 15; 23; 24]. However, in a few studies, particular health-risk behaviors were either not associated with reduced QOL (e.g., low physical activity [12], alcohol use [13], cannabis use [13]) or they were positively related (e.g., alcohol use [25]) to some QOL domains. Hence, it is important to further evaluate the associations between health-risk behaviors and QOL.

The limitations of existing studies must be considered. First, some investigations only included a single health-risk behavior or health-risk behaviors from a similar cluster (e.g., different indicators of risky alcohol consumption; [7; 9; 14; 17-19; 21; 22; 24; 25]; but a single-behavior or single-cluster approach risks missing the effects of potential confounders, because a demonstrated association between a particular health-risk behavior and QOL may be due to some other co-occurring health-risk behavior. Hence, the joint effect of different health-risk behaviors on QOL should be studied. Furthermore, certain health-risk behaviors (especially risky alcohol [4; 7-13; 15; 16; 20; 25] and tobacco consumption [4; 8; 10-20]) and

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their associations with QOL have tended to be evaluated often, whereas other health-risk behaviors (e.g., unsafe sexual behaviors; see for instance [4; 12; 22]) have rarely been studied. Lastly, most published investigations have solely been conducted in the United States [4; 7-9; 11-13; 15; 19; 22; 24; 25]. Studies performed in other countries are needed, both to replicate findings and to increase the generalizability of past results.

Due to the above-mentioned limitations, the main aim of the present analysis was to examine whether engaging in various health-risk behaviors (substance use, sexual intercourse without a condom, low physical activity) is associated with reduced or increased QOL among young Swiss men.

METHODS

Study design

Data from the *'Cohort Study on Substance Use Risk Factors' (C-SURF)* were used for the present study. The Ethics Committee for Clinical Research of Lausanne University Medical School approved the study protocol (protocol number 15/07). The sample was recruited between August 2010 and November 2011 at three of a total of six centers that recruit men for military service, covering 21 of 26 Swiss cantons (including all French-speaking cantons). Virtually all Swiss men must go through this recruitment process to determine their eligibility for military, civil or no service at roughly the age of 19 years. A representative sample of young Swiss men was eligible for the study, because no pre-selection to army conscription exists. Data were collected between September 2010 and March 2012.

Participants

Of the 15,074 conscripts who presented to one of the three recruitment centers, 1,829 were never seen by the research staff (because they were randomly selected for another study or because they were not informed by the military staff about the study). Of the remaining conscripts, 57.1% (7,563) provided informed consent, among whom 79.2% (5,990) subsequently filled out the questionnaire. As shown in a recent article, differences exist between participants and non-participants on substance use outcomes, but their magnitude is mostly small, suggesting that non-response has little effect on sample estimators [26]. For the present study, 684 men were excluded from the analysis, due to missing data on particular variables or outliers in the assessment of physical activity (see below). Consequently, the final analytical sample consisted of 5,306 men (German-speaking: 2,363; French-speaking: 2,943). Compared to German-speaking conscripts (mean age=19.64, SD=1.07), French-speaking men tended to be older (mean age=20.26, SD=1.28; $t_{5296.10}$=-19.11; $p<.001$), already had achieved a higher level of education (German-speaking conscripts: 64.4% primary school; 24.2% higher vocational school; 11.5% high school/bachelor; French-speaking conscripts: 38.6% primary school; 30.6% higher vocational school; 30.7% high school/bachelor; X^2_2= 412.40; p<.001) and were less likely to live in a rural area (51.3% vs. 70.8%; X^2_1= 209.09; p<.001).

Measurements

Socio-demographics

The following socio-demographic variables were assessed: *age* ('younger than 20 years' vs. '20 years or older'); *highest achieved education* ('primary school'; 'higher vocational school'; 'high school/university); and *type of residence* ('rural' (< 10,000 inhabitants) vs. 'urban' (≥ 10,000 inhabitants)).

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Health-risk behaviors

Health-risk behaviors in the categories of substance use, low physical activity, and sexual behavior were assessed (see below). Regarding substances that are relatively frequently consumed among young men (i.e., alcohol, tobacco, cannabis), *at-risk users* (e.g., men who consume frequently and/or in large quantities) were compared to *not at-risk users*. This approach was chosen because it is possible that only at-risk use has a detrimental effect upon QOL, whereas not at-risk use is associated with a positive QOL (e.g., regarding alcohol consumption [27]). For other illicit drugs besides cannabis, a comparison between users and non-users was made, since these substances are, relative to alcohol, tobacco or cannabis, uncommonly used. Hence, the group of at-risk users of illicit drugs would have been too small for group comparisons.

Substance use (referring to self-reported practices over the preceding 12 months)

- *Alcohol:*
  - *RSOD (RSOD=risky single occasion drinking):* Defined as consuming at least 6 standard drinks on a single occasion (pictures of standard drinks containing 10-12 grams of pure alcohol were provided for reference). Men were classified as *'not at-risk RSOD'* (which also includes those who consume no alcohol at all; coded as 0) vs. *'at-risk RSOD'* (at least monthly RSOD; coded as 1).
  - *Volume drinking:* Dichotomized into *'not at-risk volume drinking'* (which also includes those who consume no alcohol at all; coded as 0) vs. *'at-risk volume drinking'* (at least 21 standard drinks per week; coded as 1).
- *Cigarettes:* Dichotomized into *'not at-risk smoking cigarettes'* (including those who do not or only occasionally smoke cigarettes; coded as 0) vs. *'at-risk smoking cigarettes'* (daily smoking; coded as 1).

- *Cannabis:* Dichotomized into *'not at-risk cannabis use'* (including those who do not or no more than once a week use cannabis; coded as 0) vs. *'at-risk cannabis use'* (using more than once per week; coded as 1).

- *Any other illicit drugs (excluding cannabis)*: The use of illicit drugs (hallucinogenic mushrooms, psylocibin, peyote or mescalin; other hallucinogens; salvia divinorum; speed; amphetamines, metamphetamines, or amphetamine sulfates; crystal meth; poppers; solvent sniffing; ecstasy; cocaine, crack, freebase; heroine; ketamine, DXM; GHB / GBL / I-4 butanediol; research chemicals; spices or similar substances) was dichotomized into *'no use'* (coded as 0) vs. *'at least one-time use'* (coded as 1).

Low physical activity *(refers to the previous seven days):* The *'International Physical Activity Questionnaire – short form'* [28] was used to assess physical activity. The following three activity levels were constructed, in accordance with the manual [29] and based upon questions about the number of days of the week that a particular physical activity (i.e. walking, moderate or vigorous physical activity) was performed, as well as about the average time performing this/these activity/activities: 1) low; 2) moderate; and 3) high. Outliers (i.e., people who reported physical activity > 16 hours/day) were excluded [29]. For the purposes of the present article, the three categories were dichotomized into *'moderate to high physical activity'* (coded as 0) vs. *'low physical activity'* (coded as 1). The 'moderate' and 'high' categories were grouped together, because it can be assumed that people with either activity level meet physical activity recommendations [30]. In other words, at least a moderate activity level is needed to experience some health benefits.

Sexual intercourse without a condom *(refers to the last 12 months):* The question whether a person had sexual intercourse without a condom was dichotomized into *'never'* (coded as 0)

and *'at least once'* (coded as 1). This cut-off was used, since a single instance of sexual intercourse without a condom can lead to sexually-transmitted disease and unintended pregnancy.

Quality of life (refers to the last 4 weeks)

The *'Medical Outcomes Study 12-Item Short Form Survey Instrument (SF-12v2)'* [31] was used to assess QOL. As per manual guidelines, two summary measures were used: the 'physical health summary' and the 'mental health summary'. Linear transformations were performed to obtain norm-based scores (mean=50; SD=10). Due to the non-normal distribution of these transformed summary scores and based upon defining ½ a standard deviation (SD; i.e. 5) as a clinically meaningful difference in the area of QOL [32], the summary scores were dichotomized into *'(above) average QOL'* (greater or equal to 45; coded as 0) and *below average QOL* (less than 45; coded as 1).

Statistical analysis

Socio-demographic characteristics of German- vs. French-speaking conscripts were compared via chi-square analysis (categorical variables) and t-tests (continuous variables). Frequencies of particular health-risk behaviors, as well as the percentage of men who simultaneously demonstrated multiple health-risk behaviors, were depicted descriptively for the entire sample. Furthermore, the co-occurrence of health-risk behaviors was analyzed with chi-square analyses. Logistic regression analyses were conducted to examine for associations between socio-demographic variables and health-risk behaviors (univariate analyses), as well as between particular health-risk behaviors and QOL (multivariate analyses), while adjusting for socio-demographic variables (model A) and additionally for the presence of all other health-risk behaviors (model B).

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RESULTS

Approximately one third of the sample did not report any of the seven health-risk behaviors (28.4%). A further third (34.2%) reported one health-risk behavior, while the remaining men (37.4%) reported more than one health-risk behavior (two health-risk behaviors: 21.0%; three health-risk behaviors: 9.6%; four health-risk behaviors: 4.5%; five health-risk behaviors: 1.8%; six health-risk behaviors: 0.5%; seven health-risk behaviors: 0.1%).

The frequency of each health-risk behavior is presented in Table 1. At-risk RSOD (45.7%), sexual intercourse without a condom (35.0%) and daily smoking (20.3%) were most common. Furthermore, Table 1 indicates that, among men with a particular health-risk behavior, the percentage of any other health-risk behavior was higher than across the entire sample. For instance, 45.7% of the total sample reported at-risk RSOD, but this percentage was much higher among at-risk volume drinkers (95.2%). In line with this, chi-square analyses revealed significant associations between almost all health-risk behaviors. Low physical activity differed from this pattern: with the exception of at-risk RSOD (X^2=21.71; p<.001), low physical activity was not significantly associated with any other health-risk behavior studied.

Please insert Table 1 here.

The associations between health-risk behaviors and socio-demographic variables are shown in Table 2. French-speaking conscripts were more likely to report (at-risk) substance use patterns, except for at-risk RSOD (a higher percentage among German-speaking men) and at-risk volume drinking (no differences by linguistic region). Furthermore, more French- than German-speaking men reported at least one sexual encounter involving intercourse without a condom over the preceding 12 months. Relative to younger conscripts, men who were 20 years old or older more often reported at-risk smoking of cigarettes, sexual intercourse without a condom, and low physical activity. Only at-risk RSOD was more common among

the younger age group. The percentage of those who admitted to at-risk volume drinking, at-risk cigarette smoking, and at-risk cannabis use was least for men with a high-school or university degree and generally greatest for those with higher vocational schooling. Those who only had completed primary school took up an intermediate position regarding at-risk volume drinking and at-risk cigarette smoking. Men who had completed some higher vocational schooling were also more likely than those with a high-school or university degree to report sexual intercourse without a condom. Lastly, a rural residence was associated with more at-risk RSOD, but less at-risk cannabis use and a lower percentage of sexual intercourse without a condom.

Please insert Table 2 here.

In Table 3, logistic regression models of QOL as a function of health-risk behaviors are presented. Overall, these young men had a greater proportion of below average mental (26.0%) than physical (5.5%) QOL. Most health-risk behaviors were related to an increased likelihood of experiencing below average QOL. In the models that concurrently included all health-risk behaviors as well as socio-demographic variables, at-risk cigarette smoking and low physical activity were related to below average physical as well as mental QOL. Furthermore, at-risk volume drinking was associated with below average physical QOL, whereas at-risk cannabis use or the use of other illicit drugs was associated with compromised mental QOL. Two health-risk behaviors were not associated with compromised QOL. First, men who reported at-risk RSOD also reported a higher percentage of (above) average physical QOL than conscripts without this health-risk behavior (no group differences were identified for mental QOL). Second, sexual intercourse without a condom was not associated with compromised QOL.

Please insert Table 3 here.

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DISCUSSION

Consistent with the results of earlier studies [2-4], more than two thirds of the young adults in the present Swiss sample reported having engaged in at least one of the seven assessed health-risk behaviors, and most health-risk behaviors were significantly associated with each other. Furthermore, it was established that almost all health-risk behaviors were associated with a greater likelihood of experiencing compromised physical and/or mental QOL, even after controlling for the presence of other health-risk behaviors. This being said, at-risk RSOD and sexual intercourse without a condom differed from this pattern.

As mentioned above, various health-risk behaviors often seemed to occur together, a pattern that was not confirmed for low physical activity. Particularly noticeable was that men reporting low levels of physical activity were less likely to admit to one other specific health-risk behavior: at-risk risky single-occasion drinking. In other words, conscripts with a moderate to high and, hence, health-promoting activity level exhibited a riskier pattern of drinking. This might, among other things, be attributed to the competitive nature of athletes, which possibly also manifests itself by their desire to prove that they can "hold their liquor" [33]. Alternatively, it is possible that men with moderate to high levels of physical activity try to conform to the perceived norms of other athletes, which may be characterized by frequent RSOD [33].

In line with previous research [4; 8; 10-21; 23; 24], at-risk volume drinking, at-risk smoking cigarettes, at-risk using cannabis, use of any other illicit drugs, and a low physical activity level were associated with reduced QOL in the present study. This may have occurred, because young men responded to decreased QOL by engaging in health-risk behaviors (e.g., substance use) in an attempt to improve their QOL [4; 11; 22]. However, it is also possible

that the decline in QOL was a result of having been engaged in health-risk behaviors [4; 11; 22]; or that some other confounding variable (e.g., a lack of parental supervision) influenced both, yielding both particular health-risk behaviors and compromised QOL [22]. Lastly, health-risk behaviors and QOL also might influence each other in a complex manner.

The reasons behind the repeatedly-demonstrated association between health-risk behaviors and compromised *physical QOL* might differ as a function of the particular health-risk behavior. It is, for instance, possible that a subgroup of young men with low physical activity levels is obese, and that this condition is crucial to their reduced physical QOL [34], whereas smoking cigarettes might be negatively related to physical QOL, due to its negative effects on respiratory function.

The finding that various health-risk behaviors were linked to compromised *mental QOL* is consistent with studies that have identified an association between such behaviors (e.g., smoking [35] or cannabis use [36]) and depression. Even though mental QOL items and depression are not identical, they partially overlap with respect to their content [37] (e.g., 'feeling downhearted and blue' as SF-12v2 item [31] and 'decreased mood' as a symptom of depression; [38]). Hence, it can be hypothesized that at least some of the frequent cigarette and cannabis users in our sample had symptoms of depression and hence, self-reported compromised mental QOL.

Only one particular health-risk behavior was associated with positive QOL, that being at-risk RSOD. That is, this risky drinking pattern was associated with above-average physical QOL (comparable to [25]). That this result also was observable in regression models adjusted for the presence of other health-risk behaviors indicates that the finding cannot be solely explained by the demonstrated positive relationships between at-risk RSOD and moderate to high physical activity on one hand, and between moderate to high physical activity and positive physical QOL on the other. Other explanations must be considered, such as a

personality trait like extraversion, that possibly underlies both at-risk RSOD [39] and positive self-estimates of QOL [40].

Regarding *at-risk RSOD*, another result must be emphasized: this health-risk behavior was associated with compromised mental health scores in models not adjusted for other related health-risk behaviors. Multiple adjustments rendered RSOD insignificant, though still a detrimental association. This may mean that the presence of *risky behavior syndrome* (i.e., the co-occurrence of various health-risk behaviors) [1] already accounted for sufficient variance.

Contradicting earlier findings [4; 12; 22], no associations were found between risky sexual behavior (i.e., engaging in intercourse without a condom) and QOL. It can be argued that this result occurred because some men who did not use condoms were in a steady relationship, and their girlfriend used an oral contraceptive. However, as indicated by additional analyses, most participants claimed to be single (i.e., not in a steady relationship). Hence, it can be assumed that young men do not interpret sexual intercourse without a condom as a behavior that influences their physical or mental QOL. Lastly, it should be emphasized that the divergent results might have occurred due to methodological differences between the studies (e.g., regarding the definition of risky sexual behavior).

The following limitations in the present study must be considered. First, no causal inferences can be drawn due to the study's cross-sectional design; longitudinal investigations would be needed to evaluate the direction of and interactions between the associations demonstrated here. Second, interactions between multiple health-risk behaviors and QOL were not assessed, and should be explored in depth in upcoming investigations. Third, it is possible that other confounding variables – that were not included in the current analyses (e.g., personality traits like extraversion) – determined the associations identified between particular health-risk behaviors and QOL. Lastly, only men were included, and gender might have an effect, both on the reporting of certain health-risk behaviors and the association between health-risk

behaviors and QOL (e.g., [10]). Hence, future studies are needed that assess interactions between gender and health-risk behaviors on QOL. Furthermore, it must be emphasized that any subsequent implications that are constructed upon the results presented here may only be reasonable for men, and hence need to be adapted for women.

Implications

The findings have a variety of implications. On one hand, future scientific studies or publications clearly should consider multiple health-risk behaviors simultaneously, rather than single behaviors alone, given how different health-risk behaviors are often strongly associated with each other. Otherwise, the association between any given single health-risk behavior and QOL might be influenced by some other health-risk behavior(s) not accounted for.

On the other hand, various practical implications can be deduced. First, it was demonstrated that certain socio-demographic characteristics are associated with a higher likelihood of at least reporting certain health-risk behaviors. Such findings could be important for the development of target interventions. For instance, risky single-occasion drinking seems to be relatively common among young males; hence, it makes sense to address this health-risk behavior while individuals are young.

Second, that especially physically-active men are prone to risky drinking practices might indicate that interventions in sport clubs or similar settings should be conducted to reduce this behavior. This endeavor might be complicated by the discovery that risky single-occasion drinking is associated with perceived increased physical QOL. Similarly, unprotected sexual intercourse might, due to its perceived disassociation with QOL, be difficult to change.

Third, the relationship between various health-risk behaviors and compromised QOL needs to be approached via appropriate interventions. Such endeavors might be complicated by the

limited readiness for behavioral change that is typical of young people, at least when interventions aim to simultaneously target multiple health-risk behaviors [2]. However, one potentially effective way to reduce health-risk behaviors might consist of focusing on factors that simultaneously underlie such behaviors. Deduced from the results that some health-risk behaviors are associated with reduced mental QOL, one could assume that one such underlying factor might be the presence of depressive symptoms.

Lastly, it must be emphasized that not only the associations between health-risk behaviors and compromised QOL domains, but also those between health-promoting behaviors and positive QOL can be used for the conceptualization of public health interventions. For instance, the strong association between a moderate to high level of physical activity and physical as well as mental QOL could be used to generate effective slogans for the promotion of physically-active lifestyles.

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Table 1: Frequencies and co-occurrence of health-risk behaviors

	Total	…at-risk RSOD	…at-risk volume drinkers	…at-risk cigarettes smokers	…at-risk cannabis users	…illicit drug users (excl. cannabis)	…men with sex without condom	…men with a low physical activity
						% among…		
n	*5,306*	*2,427*	*311*	*1,076*	*488*	*558*	*1,855*	*475*
At-risk RSOD (%)	**45.7**	–	95.2***	59.1***	71.9***	71.1***	53.4***	35.6***
At-risk volume drinking (%)	**5.9**	12.2***	–	12.2***	16.4***	15.6***	7.8***	4.6
At-risk smoking cigarettes (%)	**20.3**	26.2***	42.1***	–	62.1***	46.8***	27.7***	22.1
At-risk cannabis use (%)	**9.2**	14.5***	25.7***	28.2***	–	40.9***	13.4***	9.3
Illicit drug use[1] (%)	**10.5**	16.4***	28.0***	24.3***	46.7***	–	16.3***	9.9
Sexual intercourse without condom (%)	**35.0**	40.8***	46.3***	47.8***	51.0***	54.1***	–	34.1
Low physical activity (%)	**9.0**	7.0***	7.1	9.8	9.0	8.4	8.7	–

Note: RSOD=risky singe occasion drinking; [1]excluding cannabis; chi-square analyses: * = $p \leq .05$; ** = $p \leq .01$; *** = $p \leq .001$

Table 2: Univariate logistic regression analyses of health-risk behaviors versus socio-demographic variables

	At-risk RSOD		At-risk volume drinking		At-risk smoking cigarettes		At-risk use cannabis		Use of illicit drugs (excl. cannabis)	
	%	OR [CI]	%	OR [CI]	%	OR [CI]	%	OR [CI]	%	OR [CI]
Total (*n* = 5,306)	**45.7**		**5.9**		**20.3**		**9.2**		**10.5**	
Linguistic region										
German	47.4	1.0	5.7	1.0	19.0	1.0	8.1	1.0	9.3	1.0
French	44.4	0.88 [0.79-0.99]*	6.0	1.05 [0.83-1.32]	21.3	1.15 [1.01-1.32]*	10.1	1.28 [1.06-1.54]*	11.5	1.26 [1.06-1.51]**
Age										
<20	47.9	1.0	6.1	1.0	17.6	1.0	8.6	1.0	10.0	1.0
≥20	42.6	0.81 [0.72-0.90]***	5.4	0.88 [0.70-1.12]	24.3	1.51 [1.32-1.73]***	10.1	1.21 [1.00-1.46]	11.3	1.15 [0.97-1.38]
Education										
high school /university	45.8	1.0	3.8	1.0	12.3	1.0	7.1	1.0	9.1	1.0
higher vocational school	45.4	0.99 [0.85-1.15]	7.1	1.91 [1.33-2.73]***	25.0	2.37 [1.92-2.92]***	9.8	1.43 [1.08-1.89]*	11.1	1.24 [0.96-1.61]
primary school	45.9	1.01 [0.88-1.15]	6.1	1.63 [1.16-2.28]**	21.2	1.91 [1.57-2.33]***	9.8	1.43 [1.11-1.85]**	10.8	1.21 [0.96-1.53]
Residence										
rural	48.3	1.0	6.2	1.0	19.5	1.0	8.3	1.0	10.1	1.0
urban	42.0	0.78 [0.69-0.87]***	5.3	0.85 [0.67-1.08]	21.4	1.12 [0.98-1.28]	10.6	1.32 [1.09-1.59]**	11.1	1.11 [0.93-1.33]

Table 2 continued

	Sex without condom		Low physical activity	
	%	OR [CI]	%	OR [CI]
Total (*n* = 5,306)	**35.0**		**9.0**	
Linguistic region				
German	33.3	1.0	8.5	1.0
French	36.3	1.14 [1.02-1.28]*	9.3	1.09 [0.90-1.32]
Age				
<20	31.0	1.0	8.1	1.0
≥20	40.8	1.53 [1.37-1.72]***	10.2	1.30 [1.07-1.57]**
Education				
high school /university	34.3	1.0	7.9	1.0
higher vocational school	38.8	1.21 [1.03-1.42]*	9.8	1.26 [0.96-1.66]
primary school	33.1	0.95 [0.82-1.10]	9.0	1.14 [0.89-1.47]
Residence				
rural	33.4	1.0	9.2	1.0
urban	37.3	1.18 [1.05-1.33]**	8.6	0.93 [0.76-1.12]

Note: CI = 95% confidence interval; OR= odds ratio; RSOD=risky singe occasion drinking; * = p ≤ .05; ** = p ≤ .01; *** = p ≤ .01

Table 3: Multivariate logistic regression models of QOL versus health-risk behaviors

	QOL: below average physical component summary			QOL: below average mental component summary		
	%	OR [CI][a]	OR [CI][b]	%	OR [CI][a]	OR [CI][b]
Total (*n* =5,306)	**5.5**			**26.0**		
Not at-risk RSOD	6.5	1.0	1.0	25.0	1.0	1.0
At-risk RSOD	4.3	0.68 [0.53-0.87]**	0.60 [0.45-0.78]***	27.3	1.20 [1.06-1.36]**	1.10 [0.96-1.26]
Not at-risk volume drinking	5.3	1.0	1.0	25.8	1.0	1.0
At-risk volume drinking	8.4	1.61 [1.05-2.45]*	2.00 [1.26-3.19]**	29.6	1.24 [0.96-1.60]	0.99 [0.75-1.30]
Not at-risk smoking cigarettes	5.0	1.0	1.0	24.8	1.0	1.0
At-risk smoking cigarettes	7.5	1.43 [1.09-1.87]**	1.42 [1.06-1.91]*	30.9	1.29 [1.11-1.50]***	1.59 [1.27-1.99]***
Not at-risk use cannabis	5.4	1.0	1.0	24.6	1.0	1.0
At-risk use cannabis	6.8	1.18 [0.18-1.72]	1.05 [0.68-1.64]	40.2	1.97 [1.61-2.40]***	1.59 [1.27-1.99]***
No illicit drugs (excl. cannabis)	5.4	1.0	1.0	24.6	1.0	1.0
Illicit drugs (excl. cannabis)	5.9	1.03 [0.71-1.50]	0.92 [0.60-1.41]	38.7	1.88 [1.56-2.27]***	1.55 [1.26-1.91]***
No sex without condom	5.0	1.0	1.0	25.2	1.0	1.0
Sex without condom	6.4	1.22 [0.96-1.56]	1.23 [0.96-1.59]	27.7	1.07 [0.94-1.22]	0.98 [0.86-1.12]
Moderate-high physical activity	4.7	1.0	1.0	25.4	1.0	1.0
Low physical activity	13.7	3.18 [2.36-4.27]***	3.05 [2.26-4.12]***	32.8	1.41 [1.15-2.40]***	1.44 [1.17-1.77]***

Note: CI = 95% confidence interval; OR= odds ratio; RSOD = risky single occasion drinking; [a] *Model A* contains a single health-risk behavior. OR are adjusted for socio-demographic variables (linguistic region; age; education; type of residence); [b] *Model B* contains all health-risk behaviors. OR are adjusted for socio-demographic variables (linguistic region; age; education; type of residence); * = p ≤ .05; ** = p ≤ .01; *** = p ≤ .001