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von Soest, T., & Pedersen, W. (2014). Hardcore adolescent smokers? An examination of the hardening hypothesis by using survey data from two Norwegian samples collected eight years apart. *Nicotine & Tobacco Research*, 16, 1232-1239. doi:10.1093/ntr/ntu058

Published by Oxford University Press.

The final publication is available on <http://dx.doi.org/10.1093/ntr/ntu058>.

Hardcore adolescent smokers? An examination of the hardening hypothesis by using survey data
from two Norwegian samples collected eight years apart

Tilmann von Soest, PhD

Department of Psychology, University of Oslo,

P.O. Box 1094, Blindern 0317, Oslo, Norway

Email: t.v.soest@psykologi.uio.no

and

Norwegian Social Research

Willy Pedersen, PhD

Department of Sociology and Human Geography, University of Oslo,

P.O. Box 1096, Blindern 0317, Oslo, Norway

Abstract

Introduction. The hardening hypothesis states that with declining prevalence and growing social disapproval of smoking, remaining smokers are more unwilling and unable to quit, as well as increasingly characterized by low socio-economic status and psychiatric comorbidity. However, few studies have examined whether such characteristics do in fact change in tandem with substantially decreased smoking prevalence.

Methods. Two nationwide population-based surveys of 16-17 year-old Norwegian adolescents were conducted according to identical procedures in 2002 and 2010. In 2002, 3,438 students participated while 2,813 did so in 2010, yielding response rates of 91.0 and 83.2%, respectively. Data on smoking behavior and a variety of psychosocial variables were obtained.

Results. The prevalence of daily smoking dropped from 23.7% in 2002 to 7.0% in 2010. The association between smoking and parental characteristics, adjustment to school and social integration also shifted, indicating smokers to be more socially disadvantaged in 2010 than 2002. However, no changes in the relationship between smoking and mental health or use of substances such as alcohol and cannabis were found, nor did the number of cigarettes smoked by daily smokers differ between 2002 and 2010.

Conclusions. The results support the hardening hypothesis, as smokers became increasingly socially disadvantaged with decreasing smoking prevalence. However, despite reduced prevalence of smoking and growing stigmatization, neither greater psychological distress nor increased substance use among adolescent daily smokers was observed.

INTRODUCTION

The hardening hypothesis rests upon two main propositions concerning how reduced smoking prevalence rates and rising social disapproval of smoking affect smokers. First, only those with a particularly strong motivation to smoke will do so when smoking prevalence rates fall, while others will either quit or not take up the habit at all. As a consequence, the remaining smokers will typically be characterized by increasing nicotine dependence and a decreasing ability to remain abstinent (Hughes, 2011). Second, these smokers will also, to a greater extent, be characterized by low socio-economic status, psychiatric comorbidity and low levels of social integration (Warner & Burns, 2003). Hardening, then, refers to an increased prevalence of “hardcore” smokers likely to continue smoking, as well as to rising levels of psychosocial disadvantage among the smoking population.

Generally speaking, new patterns in either smoking initiation or cessation may contribute to hardening. That is, those who begin smoking today may upon starting already be more socially disadvantaged than those who took up the habit in the past, accounting as such for hardening by changes in who is in fact selected into smoking initiation. Alternatively, established smokers who are able to quit with relative ease may do so more readily with increased general disapproval of smoking, whereas highly dependent smokers with significant psychosocial disadvantage may have fewer resources with which to do so. In this line of thinking, the smoking population hardens as hardcore smokers continue to smoke while most others quit. In the present study, we will meanwhile examine hardening as related in particular to smoking initiation, by investigating potential changes in psychosocial characteristics among adolescent smokers who typically will have recently started smoking during a period of significantly reduced smoking prevalence rates.

Concerning the first proposition of the hardening hypothesis, research examining whether the population of smokers changes in terms of extent of nicotine dependence as well as intention

and attempts to quit provides mixed findings: Counter to the hardening hypothesis, several studies among adults have shown that the average number of cigarettes smoked per day among smokers has fallen, while the level of nicotine dependence has not increased (Chaiton, Cohen, & Frank, 2008; Hyland & Cummings, 2003; O'Connor et al., 2006). Moreover, a recent Norwegian study found that the relative proportion of hardcore smokers has in fact declined over the past decade, at the same time as one has witnessed a clearly reduced prevalence of smoking in general (Lund, Lund, & Kvaavik, 2011). On the other hand, a much cited study measuring nicotine dependence among smokers in countries with varying prevalence rates found that levels of dependence were in fact higher in countries with lower smoking rates, thereby supporting the hardening hypothesis (Fagerström & Furberg, 2008). However, the data set selection in this study has been criticized (Etter, 2008). Thus, findings to date are inconclusive with regard to level of dependence and quitting behavior among smokers. Moreover, research has been conducted almost exclusively on the adult population. Studies addressing adolescents would provide valuable information about whether those who currently initiate smoking show higher levels of nicotine dependence and less quitting behavior than in the past.

The second proposition posits that individuals with psychosocial disadvantages will be those with the least resources with which to resist smoking (Warner & Burns, 2003). With smoking prevalence on the decline and social disapproval of smoking on the rise, one would expect the remaining smokers to have low socio-economic background, show psychiatric comorbidity, and be socially marginalized to an increasing degree.

There is solid support from cross-sectional studies for the notion that smoking is related to low socio-economic status (SES), as manifested in low levels of education and income, as well as labor market marginalization (Hiscock, Bauld, Amos, Fidler, & Munafo, 2012). Moreover, longitudinal studies show that low SES may increase the risk of both initially starting to smoke

and becoming a habitual smoker (Gilman, Abrams, & Buka, 2003). Such findings have also been reported in samples of adolescents where educational factors, such as low levels of school commitment and achievement and weak educational aspirations, predicted smoking initiation (Pennanen, Haukkala, de Vries, & Vartiainen, 2011; Tyas & Pederson, 1998).

Several studies have also examined whether the association between SES and smoking changes when smoking prevalence decreases. Whereas research on adults shows little support for an increased prevalence of smokers with low SES (see Charafeddine, Demarest, Van der Heyden, Tafforeau, & Van Oyen, 2013; Gartner, Scollo, Marquart, Mathews, & Hall, 2012; Mathews, Hall, & Gartner, 2010), studies among adolescents provide more mixed findings: German research showed the relationship between SES and adolescent smoking to remain stable between 1994 and 2004 despite the fact that smoking prevalence among adolescents increased (Richter & Leppin, 2007). A Norwegian study, moreover, showed no difference in the association between educational status and smoking between 2004 and 2007, a time interval with a strong decline in smoking rates (Øverland, Tjora, Hetland, & Aarø, 2010). In contrast, a Finnish study among adolescents showed increasing differences in smoking behavior between socio-economic groups over a 30-year time span, and particularly at times when smoking prevalence decreased, a finding consistent with the hardening hypothesis (Doku, Koivusilta, Rainio, & Rimpela, 2010).

Smoking has also been linked to mental health problems, affective disorders in particular (Degenhardt & Hall, 2001; Ziedonis et al., 2008). Some research indicates smoking to have a causal influence on mental health (Pedersen & von Soest, 2009), whereas other studies indicate bi-directional causal relationships (Leung, Gartner, Hall, Lucke, & Dobson, 2012). Comorbidity between smoking and the use of other substances, such as alcohol and cannabis, has also been found (Degenhardt & Hall, 2001; Degenhardt, Hall, & Lynskey, 2001). Few studies have examined whether the degree of such comorbidity increases when smoking prevalence declines.

If some Australian studies stand apart, they have not provided evidence for increasing psychological distress among smokers (Gartner et al., 2012; Mathews et al., 2010). Nor did a US study support the hardening hypothesis when examining the association between smoking and depression over a time span when smoking rates declined (Johnson & Breslau, 2006). However, adults were the focus of research in these studies, whereas data on adolescents have not yet been reported.

In sum, while research has provided solid evidence that smokers are disadvantaged concerning SES and mental health, studies have not yet provided evidence that such disadvantages have in fact increased amid falling rates of smoking. However, the studies conducted are limited concerning the number of psychosocial disadvantage variables included and limited research on adolescents has been conducted. Moreover, the prevalence of smoking in most populations under study decreased only modestly, which may account for the lack of change observed. Based on the available evidence, no firm conclusions can as yet be drawn.

An important issue that remains to be examined is whether smokers are becoming more socially excluded. During the last couple of decades, smoking has become an increasingly stigmatized habit (Bell, Salmon, Bowers, Bell, & McCullough, 2010), with smokers increasingly judged in negative terms (Graham, 2012). However, few studies have investigated whether smokers experience a greater degree of social stigma or exclusion when prevalence rates decline.

Repeated population-based studies of adolescents before and after a significant drop in smoking prevalence provide the ideal research design to investigate whether those who currently initiate smoking differ from those who did so previously. The time span between 2002 and 2010 is a strategic period to assess, as new and much stricter tobacco legislation was implemented in Norway in 2004 prohibiting smoking in bars and restaurants. At the same time, a number of anti-smoking campaigns were launched (Lund et al., 2011). Concurrent to these interventions, a

considerable decrease in smoking prevalence among adolescents has been observed (Vedøy & Skretting, 2009).

Using survey data we will examine whether 16 to 17 year-old smokers in 2010 were more psychosocially disadvantaged than in 2002. We will investigate possible differences with regard to: (i) parental background, including SES, (ii) school adjustment, (iii) mental health and substance use, and (iv) social integration.

METHODS

Procedure and participants

In 2002, all 535 senior high schools in Norway were included in the register from which the students in the present study were selected. Schools were drawn with probability according to size (proportional allocation), and students from 28 senior high schools comprised the study sample. A new data collection was conducted in 2010. The same schools were asked to participate, of which two declined. These were replaced by back-up schools with similar geographic location and size. See von Soest and Wichstrøm (2014) for more details.

Every student gave informed consent according to standards prescribed by the Norwegian Data Inspectorate, and the Regional Committee for Medical Research Ethics endorsed the surveys. The students completed the questionnaire in class and those not present at the time of data collection completed the survey at a later occasion. In 2002, students from all three years of senior high school were included, and 5,880 out of 6,460 eligible students participated (response rate 91.0 %). In 2010, only first- and second-year students participated, with 3,335 out of 4,009 eligible students completing the questionnaire (response rate 83.2%). To increase sample comparability, only students aged 16 and 17, attending the first or second year of senior high-school, were included in the present study. As such, the data set consisted of 3,438 students in 2002 and of 2,813 in 2010.

Measures

All measures were based on students' self-reports.

Smoking. Response options to the question "Do you smoke?" were "Have never smoked", "Have never smoked regularly and do not smoke now", "Have smoked regularly, but have quit now", "Do smoke, but not daily", and "Smoke daily". The first three response categories were combined to one, indicating that the participant did not currently smoke. A dummy variable was constructed, contrasting daily smokers (value 1) with non-smokers (0). Non-daily smokers were excluded from the analyses. Participants indicating that they smoked daily were asked how many cigarettes they smoked per day.

Socio-economic background and parental characteristics. We assessed level of education for each parent, ranging from *Junior high school* to *University or college degree*. A mean score of both measures was computed to assess combined parental educational level, ranging from 1 (lowest level of education) to 4 (highest level of education). As a measure of perceived poverty, we asked: "Has your family been well off or short of money during the last two years?" Response options spanned a 5-point scale, and a dummy variable was constructed where a perception of the family as poor (short of money *all the time* or *most of the time*) was coded as 1, whereas all other response options were coded 0. We also determined whether participants were living with both biological parents (value 0) or not (1). As a proxy for "cultural capital" (Bourdieu, 1984), we asked about the number of books at home, with response options spanning from *1 – None* to *7 – More than 1000 books*. To address parental alcohol intoxication, we asked: "Have you ever seen your parents drunk?" Response options were on a 5-point scale, wherein we contrasted those who reported a frequency of *some times a month* or more often (value 1) with those who indicated lower frequencies (0). Family conflict was assessed by the item "There are often arguments between adults in my family", while parental monitoring was tapped by the item "My parents

usually know where I am and what I do in my spare time". Both items had response options ranging from *1 – Not true at all* to *5 – Completely true*.

School adjustment, educational plans. Participants were asked to provide information about their grades in Norwegian, mathematics, and English and a mean score was computed ranging from 1 (lowest grade) to 6 (highest grade). Time spent on homework was assessed with a 7-point scale, from *1 – None* to *7 - More than 4 hours*. We asked about the number of times the respondent had been truant from school over the past year, with responses ranging on a 5-point scale from *None* to *More than 20 times*. Finally, we asked about plans for future education, whereby *University or other lengthy education* (1) was contrasted with other response options (0).

Mental health and drug use. Depressive symptoms were measured by Kandel and Davies' (1982) Depressive Mood Inventory. Response options ranged from 1 to 4 and mean scores were computed whereby higher scores indicated a higher level of depressive symptoms. Internal consistency was $\alpha = .83$. A 15-item measure to assess conduct problems over the past 12 months approximating the diagnostic criteria for conduct disorders in DSM-III-R was employed (Wichstrøm, Skogen, & Øia, 1996). All respondents were categorized into having (value 1) or not having (0) conduct problems according to procedures described by Wichstrøm and colleagues (1996). Data were collected on frequency of alcohol intoxication during the past 12 months using a 6-point response scale ranging from *1 – Never* to *6 – More than 50 times*. Cannabis use during the past 12 months (*0 – No, 1 – Yes*) was also assessed

Social integration. To measure perceived social acceptance, a revised version of the Self-Perception Profile for Adolescents was used, including the five-item subscale Social Acceptance (Harter, 1988; Wichstrøm, 1995). Response options ranged from *1 – Describes me very poorly* to *4 – Describes me very well* and mean scores were computed with high scores indicating high social acceptance. Further, one item indicating whether the respondents had been bullied at

school or on the way to or from school was included, with response options from 1 – *Never* to 5 – *Every day or almost every day*. Those who reported never or rarely (value 0) having been bullied were contrasted to those who were bullied more frequently (1).

Covariates. Age, gender, and country of birth (Norway versus abroad) were assessed.

Analyses

χ^2 tests were used to investigate time trends between 2002 and 2010 in smoking and other dichotomous variables included in the study. Time trends in continuous variables were examined by t-tests. The Mann-Whitney test was used to test for differences in the number of cigarettes smoked per day among daily smokers between 2002 and 2010. Potential gender differences in smoking prevalence rate changes over this time span were assessed by logistic regression analysis, where daily smoking was the dependent variable, with time, gender, and the product term of time and gender serving as independent variables. In this interaction analysis, no significant gender difference was found ($p=.40$). Likewise, potential gender differences in the relationship between predictors and smoking behavior were tested with interaction analyses at each time point. Of all variables, only cannabis use had a significantly stronger association in 2010 for girls than boys (girls: OR=24.85, 95% CI: 12.99-47.55; boys: OR=9.44, 95% CI: 6.23-14.31; $p=.02$). Data from boys and girls were as a result combined in all further analyses.

The relationship between psychosocial variables and smoking was examined by means of logistic regression analyses at each time point separately. Potential differences in the relationship between predictors and smoking between 2002 and 2010 were tested by including time period, the predictor, and an interaction term. In all analyses, age, gender, and country of birth were included as covariates. Maximum likelihood estimations were used in all regression analyses. Standard errors were computed by taking into account that students were clustered within schools. For this purpose, potential non-independence of observations due to school clusters was

addressed by estimating parameters by maximizing a weighted log-likelihood function, whereas standard error estimations were performed with a sandwich estimator (Muthén & Muthén, 2012).

RESULTS

As presented in Table 1, the prevalence of daily smoking declined substantially from 2002 to 2010 for both girls and boys, with an overall decline from 23.7% to 7.0%. The proportion of non-daily smokers also declined, if more modestly, from 12.3% to 8.1%. However, this decline was only significant for girls. There was a slightly higher percentage of girls smoking daily in 2002 compared to boys ($\chi^2[2] = 6.41, p=.04$), whereas no such gender difference was found in 2010 ($\chi^2[2] = 3.30, p=.19$). In 2002, the average number of cigarettes smoked per day among daily smokers was 11.94 (SD=6.77, Median = 10.00), while the mean in 2010 was 12.30 (SD=8.66, Median = 10.00), a difference which was not significant (Mann-Whitney U=76400, $p=.47$). Non-daily smokers were excluded from all further analyses.

In Table 2, descriptive statistics of all other variables at both 2002 and 2010 are depicted. Most notably, the frequency of drug use and conduct problems decreased significantly between 2002 and 2010. Moreover, adolescents reported to be better adjusted at school at the latter assessment point.

Next, as presented in Table 3, the association between smoking and a variety of psychosocial variables was tested both in 2002 and 2010, and interaction analyses conducted to determine whether the relationships varied according to time point. Parental alcohol intoxication and low parental monitoring were significantly more strongly related to smoking in 2010 than 2002. Moreover, the remaining five parental variables all showed similar tendencies, with in particular few books at home and family conflict showing nearly significant stronger associations with smoking in 2010 than in 2002.

When examining adjustment to school, we found that the association between smoking and poor school grades was significantly strengthened from 2002 to 2010. Likewise, having no plans to study at university was more strongly associated with smoking in 2010 than in 2002. No significant changes were found for the association between smoking and several measures of mental health or substance use. Finally, both indicators of social integration showed significant change in their relationship to smoking: Whereas smoking was related to a higher level of social acceptance than not smoking in 2002, no such difference was found in 2010. While smokers did not report more bullying in 2002 than non-smokers, the odds to be bullied as a smoker were more than twice as high in 2010 compared to non-smokers.

DISCUSSION

In the present study we observed a marked fall in the prevalence of daily smoking, a reduction of more than two thirds from 2002 to 2010. At the same time, daily smokers became more disadvantaged in relation to parental risk factors such as alcohol intoxication and low level of monitoring. Moreover, they reported poorer adjustment to school and weaker social integration; in all these respects we have witnessed a hardening of smokers. Meanwhile, no changes in the association to mental health and substance use were found, and the number of cigarettes smoked by daily smokers remained stable. Results provide partial support for the hardening hypothesis: Daily smokers became more disadvantaged with regard to parental background, adjustment to school and social acceptance.

The findings contrast with previous studies where only weak support for the hardening hypothesis was found when examining socio-economic factors. These studies were however mainly conducted over time spans during which the prevalence of daily smoking decreased to a much lesser extent than in the present study. Thus, the lack of support from previous studies may stem in part from a lower concurrent reduction in smoking prevalence.

Self-reported social acceptance was reduced while the experience of being bullied increased. These results may indicate that the growing stigmatization of smokers bears direct consequences for degree of popularity and social integration. Alternatively, those who are popular among peers may now choose to abstain from smoking, perhaps because they assume smoking will have a negative impact on how they might be perceived by their peers.

The number of cigarettes smoked by daily smokers did not increase. This finding echoes other reports showing that declining prevalence of smoking is not connected to a greater number of cigarettes smoked among those who still smoke (Chaiton et al., 2008; Warner & Burns, 2003). However, this finding may not necessarily indicate that smoking dependency among smokers did not increase; it may also reflect increased restrictions on smoking, as a growing number of social arenas have been defined as smoke-free over the time span covered in the study. Likewise, no changes in the association between smoking and mental health or the use of alcohol and cannabis were found between 2002 and 2010. These results are supported by other studies as well showing no change over time in levels of depression or psychological distress among smokers (Gartner et al., 2012; Johnson & Breslau, 2006; Mathews et al., 2010). The results are also in accordance with findings indicating the association between smoking and mental health problems to be at least in part due to a causal influence of smoking on mental health (Leung et al., 2012; Pedersen & von Soest, 2009). With no indication that daily number of cigarettes increases, no rise in mental health problems among smokers should in turn be expected.

The results indicate that the hardening hypothesis may, in some respects, be valid. We can say hardening been witnessed if defined as increased social marginalization: Those from lower socio-economic strata, who perform poorly at school and are socially less integrated than non-smokers, appear to increasingly constitute the population of adolescent daily smokers.

Several well established theories may help us to explain how this has occurred: First, the findings may be interpreted from a diffusion of innovations perspective (Rogers, 2003), whereby it is predicted that smoking spreads in stages. The habit is introduced by high status groups, then gradually spreads to lower socio-economic strata, while the high status groups are also the first in which adults quit smoking and adolescents abstain from taking it up (Doku et al., 2010). Northern European countries are now considered to be in the final stage of diffusion, at which smoking rates decline in high socio-economic groups, but remain higher in low socio-economic strata (Cavelaars et al., 2000).

Second, our findings are also in congruence with analyses showing that adolescents tend to initiate smoking in concert with their social group, and that groups with high numbers of smoking adolescents tend to be characterized by members of lower socio-economic background than non-smoking groups (Huisman & Bruggeman, 2012).

Third, the findings may be explained by the “knowledge gap” hypothesis, which states that those with higher socio-economic status acquire research-based information through the media at a faster rate than those from lower socio-economic strata, leading to increased socio-economic differences in such knowledge over time (Tichenor, Donohue, & Olien, 1970). The anti-smoking campaigns conducted in Norway during the study period may as such have influenced adolescents with higher SES to abstain from smoking to a greater extent, thereby leading to a larger decrease in their smoking rates compared to adolescents with lower SES.

Limitations

Several limitations of the present study should be acknowledged. First, the study only provides information on smoking status and number of cigarettes smoked. Ideally, other measures of nicotine dependence, as well as information about the ability to abstain from smoking, and attempts to quit should have also have been provided.

Second, the response rate decreased by 7.8% between 2002 and 2010. Research indicates that smoking predicts to some degree non-response in epidemiological studies (Goldberg, Chastang, Zins, Niedhammer, & Leclerc, 2006; Thygesen, Johansen, Keiding, Giovannucci, & Gronbaek, 2008). If smokers have dropped out at a faster rate than non-smokers, we could have underestimated the prevalence of smokers in 2010 compared to 2002.

Third, even though self-report measures of adolescent substance use have been shown to be reliable (Barnea, Rahav, & Teichman, 1987; Johnson & Mott, 2001), such measures might increasingly underestimate the prevalence of tobacco use due to the rising social stigma related to such behavior.

Fourth, the study population consisted of 16 and 17 year-old adolescents, thereby presumably providing information about teenagers who have only recently started to smoke. The study provides as such information about only one of two possible hardening mechanisms, namely those selected into smoking.

Finally, the study does not offer insight into the causal relationship between smoking and the psychosocial variables covered in the study. On the one hand, it is possible that more socially disadvantaged adolescents have to a greater extent been selected into becoming daily smokers. On the other hand, the growing social disapproval of smoking may have contributed to adolescent smokers having become more stigmatized and socially excluded.

Conclusion

The present study indicates that adolescent smokers are more psychosocially disadvantaged than they were a decade ago, when smoking was more prevalent. The results may suggest that future smoking prevention strategies specifically target such disadvantaged groups. Both research and interventions should, moreover, place a particular focus on how smokers have become socially excluded through the increasing stigmatization of smoking. Although it has been

argued that climbing stigmatization may actually lead to an utter reduction in smoking prevalence (Bayer, 2008), the negative consequences of such stigmatization should no less be accounted for in future research and interventions.

FUNDING

The data collection in 2002 was funded by the Research Council of Norway. The data collection in 2010 was funded by the Norwegian Gaming and Foundation Authority.

DECLARATION OF INTERESTS

None declared

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Table 1. Prevalence of Daily Smoking in 2002 and 2010 by Gender

	Girls			Boys			Total		
	2002	2010	Change in prevalence	2002	2010	Change in prevalence	2002	2010	Change in prevalence
	% (N)	% (N)	p	% (N)	% (N)		% (N)	% (N)	p
Daily smoking	24.6 (409)	7.0 (93)	<0.001	22.9 (387)	7.0 (96)	<0.001	23.7 (796)	7.0 (189)	<0.001
Non-daily smoking	13.4 (223)	7.2 (95)	<0.001	11.1 (188)	9.1 (125)	0.062	12.3 (411)	8.1 (220)	<0.001
No smoking	62.0 (1,033)	85.8 (1,136)	<0.001	65.9 (1,113)	83.9 (1,155)	<0.001	64.0 (2,146)	84.9 (2,291)	<0.001

Table 2. Means, Standard Deviations (SD), Frequencies (N), and Percentages (%) for 20 Variables Included in the Analyses in 2002 and 2010

	2002	2010	Test of difference between time points, <i>p</i>
<i>Parental characteristics</i>			
Parental education (1-4), Mean (SD)	2.77 (0.91)	2.88 (0.88)	<0.001
Perceived poverty (0-1), N (%)	8.0 (273)	7.0 (190)	0.155
Not living with biological parents (0-1), N (%)	34.5 (1179)	42.0 (1173)	<0.001
Books at home (0-6), Mean (SD)	3.72 (1.28)	3.50 (1.34)	<0.001
Parental alcohol intoxication (0-1), N (%)	7.4 (251)	6.7 (181)	0.296
Parental conflict (1-5), Mean, (SD)	1.87 (1.07)	2.00 (1.04)	<0.001
Parental monitoring (1-5), Mean (SD)	3.87 (1.00)	4.01 (0.92)	<0.001
<i>School adjustment</i>			
School grades (1-6), Mean (SD)	3.66 (0.85)	3.72 (0.85)	0.003
Homework (1-7), Mean (SD)	2.70 (1.28)	2.87 (1.35)	<0.001
School truancy (0-5), Mean (SD)	1.18 (1.27)	0.89 (1.12)	<0.001
University plans (0-1), N (%)	54.2 (1,852)	56.0 (1,543)	0.141
<i>Mental health and drugs</i>			
Depressive symptoms (1-4), Mean (SD)	1.88 (0.65)	1.85 (0.69)	0.055
Conduct problems (0-1), N (%)	3.6 (123)	1.9 (51)	<0.001
Alcohol intoxication (1-6), Mean (SD)	3.36 (1.75)	2.70 (1.64)	<0.001
Cannabis use (0-1), N (%)	16.2 (552)	7.6 (207)	<0.001
<i>Social inclusion</i>			
Social acceptance (1-4), Mean (SD)	3.17 (0.51)	3.24 (0.53)	<0.001
Being bullied (0-1), N (%)	4.7 (160)	3.6 (101)	0.044
<i>Covariates</i>			
Age, Mean (SD)	16.59 (0.49)	16.55 (0.50)	0.002
Female (0-1), N (%)	49.6 (1,697)	48.2 (1,347)	0.262
Not ethnic Norwegian (0-1), N (%)	5.1 (174)	6.5 (181)	0.019

Note. N = 3,438 in 2002; N = 2,813 in 2010

Table 3. Odds Ratios (OR) and their 95% Confidence Intervals (95% CI) for the Relationship between Psychosocial Factors and Daily Smoking in 2002 and 2010 and Results from Interaction Analyses Between Study Year and Psychosocial Factors

	2002		2010		Significance of interaction term
	OR	95% CI	OR	95% CI	p
<i>Parental characteristics</i>					
Parental education	0.76***	0.66-0.87	0.63***	0.50-0.78	0.152
Perceived poverty	1.94***	1.56-2.41	2.71***	1.86-3.93	0.128
Not living with biological parents	2.14***	1.78-2.57	2.31***	1.59-3.37	0.753
Books at home	0.85***	0.78-0.92	0.69***	0.57-0.84	0.051
Parental alcohol intoxication	2.61***	2.07-3.30	4.69***	3.12-7.06	0.015
Parental conflict	1.20***	1.13-1.27	1.37***	1.19-1.58	0.083
Parental monitoring	0.61***	0.55-0.68	0.51***	0.44-0.58	0.018
<i>School adjustment</i>					
School grades	0.48***	0.41-0.57	0.32***	0.27-0.39	<0.001
Homework	0.60***	0.53-0.68	0.53***	0.43-0.65	0.288
School truancy	2.02***	1.84-2.22	2.12***	1.86-2.42	0.559
University plans	0.36***	0.28-0.46	0.23***	0.18-0.31	0.028
<i>Mental health and drugs</i>					
Depressive symptoms	1.62***	1.39-1.89	1.71***	1.34-2.19	0.840
Conduct problems	8.23***	5.69-11.92	15.09***	8.14-27.96	0.051
Alcohol intoxication	1.87***	1.72-2.04	1.80***	1.54-2.10	0.601
Cannabis use	14.43***	10.81-19.27	14.38***	9.99-20.69	0.848
<i>Social inclusion</i>					
Social acceptance	1.65***	1.33-2.05	1.04	0.78-1.38	0.013
Being bullied	1.11	0.87-1.42	2.17**	1.30-3.62	0.015

Note. * p <.05, ** p<.01, *** p <.001; N = 3,438 in 2002; N = 2,813 in 2010

All analyses controlled for age, gender, and country of birth