

Classroom Achievement Goal Structure, School Engagement, and Substance Use Among 10th Grade Students in Norway

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The present study was aimed at investigating the relationships between students' perceived classroom achievement goals, school engagement and substance use in terms of smoking and drinking, and at investigating gender differences regarding these issues in a sample of 1,239 Norwegian 10th grade students. A multivariate analysis showed that motivational and affective school engagement was predicted primarily by the students' perception of a mastery goal structure. However, motivational engagement was significantly more strongly predicted by achievement goal structures among boys than girls, in particular by mastery goal structure. The results also showed that school engagement, particularly motivational engagement, was negatively related to substance use. In conclusion, school engagement seems to be an important multi-dimensional indicator of motivation which is related both to perceived classroom goal structure and to students' substance use in terms of smoking and drinking. Despite the correlational design of the present study, it is reasonable to advise the promotion of a mastery goal structure in the classroom.

Keywords: Classroom achievement goal structure, school engagement, substance use, gender differences, motivation

INTRODUCTION

School engagement has emerged as an important indicator of adjustment to life among adolescents (Archambault, Janosz, Fallu, & Pagani, 2009). Whereas students with a high level of school engagement are generally more successful at school, disengaged students are more likely to perform poorly and to exhibit problem behavior (Simons-Morton, 2004; Wang & Holcombe, 2010). For example,

lack of school engagement among adolescents may increase the risk of school dropout, substance use (e.g., smoking and drinking), teenage pregnancy, and criminal activity (Blondal & Adalbjarnardottir, 2012; Caraway, Tucker, Reinke, & Hall, 2003; Sagatun, Heyerdahl, Wentzel-Larsen, & Lien, 2014). From a health perspective, a major objective is preventing adolescents from initiating substance use because this is a risk factor for subsequent substance use (Simons-Morton, 2004).

Given that there is a relationship between school engagement and substance use, it would appear important to investigate factors in schools and classrooms that may be associated with the students' level of school engagement (Lam et al., 2014). For example, previous research has shown that students' school engagement may be accounted for by how they experience the learning climate at school, in particular by the classroom achievement goal structure

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(Gonida & Kiosseoglou, 2009). Students who perceive the classroom structure as mastery-oriented are more motivated to learn than students who perceive the classroom structure as performance-oriented (Pintrich, 2000). Previous research has also recommended that classroom structure should be examined in future work on the importance of learning climate on school engagement (Fredricks, Blumenfeld, & Paris, 2004).

Taken together, motivational aspects of the classroom environment are considered to be predictors of school engagement, whereas a low level of school engagement is considered to be a risk factor for engaging in problem behaviors. However, to our knowledge, previous research has not included perceived classroom structure, school engagement, and problem behavior in the same study. Previous research has either focused on the relationship between classroom achievement goal structure and school engagement (Gonida & Kiosseoglou, 2009; Wang & Holcombe, 2010), or on the relationship between school engagement and problem behavior in terms of smoking and drinking (Simons-Morton, 2004). Hence, a main purpose of the present project is to incorporate all of these variables in a single study, thus uniting these traditions of research. This research may be useful to test the multivariate relationships between the motivational constructs of achievement goal structure and school engagement, and their relative importance as predictors of substance use among adolescents.

Whereas gender differences have been investigated with regard to smoking and drinking (Rodham, Hawton, Evans, & Weatherall, 2005; Skretting & Bye, 2003), this issue has rarely been included in previous research on classroom goal structure or school engagement. However, given the fact that the multivariate relationships between motivational factors (achievement goal structure and school engagement) and smoking and drinking is less known, it would seem appropriate to also investigate gender differences regarding the relationships between all of these variables. This research may identify gender-specific risk factors of detrimental behaviors and their relationship to motivational factors in the school context. Finally, the present study will investigate these issues in a sample of Norwegian adolescents, thus providing an opportunity to test the validity of findings that have previously been obtained from other cultural contexts.

School Engagement and Substance Use Among Adolescents

The construct of school engagement originates in part from social control theory (Hirschi, 1969) which emphasizes individual feelings of attachment and belongingness to social institutions (Hawkins & Weis, 1985). As the bonds in social control theory are characterized by commitment, beliefs, attachment, and engagement (Archambault et al.,

2009), school engagement may be considered to be an important aspect of school bonding (Jimerson, Campos, & Greif, 2003). It may be defined in terms of the extent to which students are involved, connected, and committed to school, and motivated for learning and achievement (Simons-Morton & Chen, 2009).

School engagement may be considered as a form of connectedness characterized by attachment and close affective relationships with those at school, as well as by an investment in school and by commitment to doing well in school (Catalano, Oesterle, Fleming, & Hawkins, 2004). In general, low school connectedness is significantly associated with health-compromising behaviors (Bond et al., 2007; Conrad, Flay, & Hill, 1992; Samdal, Wold, Klepf, & Kannas, 2000). Several studies have found a relationship between low levels of student connectedness and higher levels of substance use. For example, Resnick et al. (1997) found that perceived school connectedness was protective against smoking and drinking among adolescents (grades 7–12). Another study found that school connectedness during the middle and high school years, measured from ages 10 to 18, was significantly and negatively associated with substance use (Catalano et al., 2004). Furthermore, early experimentation with smoking and drinking is associated with both immediate and lasting problems, which can result in profound, long-term health and social consequences (McGinnis & Foege, 1993). For example, adolescence is a key period for the development of regular smoking because much of smoking initiation occurs during this period (Flay, Ockene, & Tager, 1992; Winkleby, Fortmann, & Rockhill, 1993). Behavior that is detrimental to health is considered as an important negative outcome of low school engagement, and students' engagement in school is of importance for minimization against negative developmental outcomes (Estell & Perdue, 2013).

Hence, attachment to conventional social institutions (e.g., school) is considered to be negatively related to problem behavior, such as smoking and drinking (Simons-Morton, 2004). For example, Carter, McGee, Taylor, and William (2007) found that school engagement was negatively related to smoking and drinking among 16-year-old students. Furthermore, a study by Simons-Morton (2004) showed that school engagement was negatively associated with drinking. Other studies have also reported that disengagement is associated with drug use and other risky health behaviors (Fletcher, Bonell, & Hargreaves, 2008). In a longitudinal study of 7th- to 11th-grade students, Wang and Fredricks (2014) found that declines in behavioral and emotional engagement with school were associated with increased smoking and drinking, and that this relationship was bidirectional over time. However, a longitudinal study of middle-school students showed that students' engagement in and enjoyment of the curriculum was not associated with changes in students' smoking and drinking habits (Ringwalt et al., 2009).

According to social control theory, lack of commitment to conventional goals increases the risk of substance use, and adolescents will be more at risk for smoking and drinking if they devalue academic achievement orientation (Jessor, Donovan, & Costa, 1991). Hence, higher school engagement may be protective against problem behaviors such as drinking and smoking.

Classroom Achievement Goal Structure and School Engagement

School engagement is considered to be responsive to contextual and environmental factors, including school climate, classroom environments, and social relationships with teachers and peers (Chen, 2005; Wang & Holcombe, 2010). For example, research within self-determination theory (SDT) has presumed a causal sequence, wherein the perceived school environment contributes to individual engagement with school, which in turn leads to achievement (Deci & Ryan, 2000).

Classroom achievement goal structure derives from achievement goal theory, which defines goals as the purpose of engaging in achievement behavior (Linnenbrink-Garcia, Tyson, & Patall, 2008), or as cognitive representations of future states that an individual is committed to approach or avoid (Elliot & Fryer, 2008). When applied to the classroom context, a mastery goal structure refers to the promoting of students' perceptions of self-improvement and reward of effort as the main goal of learning. Conversely, a performance goal structure means that the students will perceive striving for high grades (performance approach) or avoiding poor grades (performance avoidance) as the main goal of learning, including social comparison and promotion of competition among students (Anderman & Midgley, 1997).

Whereas some studies have investigated indices of actual school structure, most research has focused on the students' perceptions of school, particularly in terms of the school climate. For example, Wolters (2004) found that junior high school students' self-reported assessment of their perceived classroom mastery goal structures was positively related to adaptive outcomes at school. Also, a study of seventh- and ninth-grade students showed that perceived school mastery goal structure, but not performance structure, was positively related to behavioral and emotional school engagement (Gonida, Voulala, & Kiosseoglou, 2009). Finally, Wang and Holcombe (2010) found that indicators of school engagement were positively predicted by perceived mastery goal structure, and negatively predicted by perceived performance goal structure. It has been suggested that the achievement goal structures created by schools influence students' engagement because they affect students' confidence in their abilities to master academic tasks (Roeser, Eccles, & Sameroff, 2000).

School engagement is considered as a multidimensional construct, comprising behavioral, emotional, cognitive, and motivational engagement (Fredricks et al., 2004; Garvik, Idsoe, & Bru, 2014; Lam et al., 2014). However, previous research has seldom included multiple dimensions of school engagement, and this has prevented understanding of differences between aspects of this construct (Wang & Holcombe, 2010). Hence, the current study includes two aspects of school engagement in terms of motivational engagement, which is an indicator of the desire to do well (Simons-Morton & Chen, 2009), and emotional engagement, which includes students' feelings about the school, teachers, and peers.

Whereas the relationship between school engagement and substance use in terms of smoking and drinking is established in the research literature, there is less knowledge about the role of classroom achievement goal structure as a predictor of smoking and drinking. However, given the fact that school engagement is related to classroom achievement goals, in particular to mastery goals, these goals may also be negatively related to smoking and drinking: If students view the climate of their school favorably, they should be motivated and well-behaved (Simons-Morton & Crump, 2003). On the other hand, smoking and drinking may be more consistently related to school engagement than to classroom achievement goal structure, because smoking, drinking, and school engagement are all expressions of personal behavior and attitudes, rather than perceptions of the classroom structure.

Gender Differences

Research on the students' personal achievement goals has provided some indications of gender differences. Whereas a review by Linnenbrink-Garcia et al. (2008) concluded that there are small overall gender differences, some research has shown that girls are more likely to adopt mastery goals, while boys tend to adopt performance approach goals. Furthermore, performance goals may be more adaptive for boys and mastery goals more adaptive for girls. Assuming a relationship between perceived classroom goal structure and adoption of personal achievement goals (Gonida et al., 2009; Skaalvik & Skaalvik, 2013), it can probably be expected that these gender differences may also hold for perceived classroom goal structure, although previous research has not focused on this issue.

Previous research has also found gender differences in the prevalence of smoking and drinking. For example, research on a representative sample of 15- to 16-year-old UK adolescents showed that females were more likely to smoke, but males were more likely to be heavy smokers. Males were also more likely to report drinking, and they were also heavier drinkers (Rodham, Hawton, Evans, & Weatherall, 2005). These findings are also in accordance with subsequent research (Carter et al., 2007).

However, a study of a representative sample of Norwegian adolescents showed that 51% of 15- to 16-year-old students reported drinking alcohol in the past 30 days (49% boys and 54% girls). The same study showed that about 30% had smoked during the past 30 days. Although there were small gender differences, more girls than boys reported that they had smoked and drank over the past 30 days (Skretting & Bye, 2003). However, a more recent survey of Norwegian adolescents showed small gender differences in smoking and drinking (SAMDAL et al., 2012).

There appears to be less knowledge about gender differences in the relationship between smoking and drinking and school engagement. Simons-Morton (2004) found no gender differences in the relationship between school engagement and smoking and drinking in a sample of 6th graders. Nevertheless, the present study will explore this issue further.

Problems and Hypotheses

To sum up, theoretical considerations and previous research findings call for further investigation of the interrelations among perceived achievement goal classroom structure, school engagement, and smoking and drinking among adolescents.

In particular, the current study aims to investigate how two aspects of school engagement (motivational and affective) may be accounted for by perceived classroom achievement goals. It is expected that both types of school engagement will be positively predicted by mastery classroom achievement goals (Hypothesis 1).

A second aim is to investigate whether classroom achievement goals and school engagement are related to smoking and drinking in terms of smoking and drinking. It is expected that smoking and drinking will be negatively related to school engagement (Hypothesis 2).

Finally, gender differences will be explored regarding both of these hypotheses. Whereas gender differences may be expected regarding both mean level scores and the relationship between variables, the nature of these differences remains to be understood due to lack of previous research regarding classroom goal structure and school engagement, and somewhat inconsistent findings regarding smoking and drinking. Hence, no specific hypothesis is assumed regarding gender differences.

METHODS

Participants

Data were collected by means of questionnaires administered in school classes following a standard protocol (Roberts et al., 2009). In order to ensure a

representative sample, a standard cluster sampling procedure from a geographically stratified list of Norwegian students was utilized, with school classes or schools as the primary sampling unit (SAMDAL et al., 2012). The sample comprised 1,239 Norwegian students in 10th grade lower secondary school (653 boys and 586 girls) in 60 classes. The average class size was 20.65. Data collection was performed during a school lesson by the class teacher, and students' confidentiality was ensured. Parents were informed about the survey in advance, and could elect to withdraw their child from participation (passive consent).

Measures

Classroom achievement goal structure

Items from the Patterns of the Adaptive Learning Survey (PALS; Midgley et al., 2000) were adapted to measure the students' perceived mastery, performance approach, and performance avoidance classroom structure, with three items for each variable. Sample items include, "In our class, how much you improve is really important" (mastery); "In our class, getting good grades is the main goal" (performance approach); and "In our class, it's important not to do worse than other students" (performance avoidance). A preliminary confirmatory factor analysis supported a latent three-factor solution for motivational and affective engagement (chi square = 158.45, $df = 19$, $p < .001$, chi square/ $df = 8.34$, CFI = .97, RMSEA = .08). An alternative one-factor solution produced a less satisfactory model fit (chi square = 316.77, $df = 24$, $p < .001$, chi square/ $df = 13.20$, CFI = .94, RMSEA = .10).

School engagement

Students' engagement for school was measured in terms of motivational and affective engagement. Motivational engagement was assessed using three items adapted from Simons-Morton & Chen (2009). These items originated from Pyper, Freiberg, Ginsburg, and Spuck (1987), and comprised two items assessing motivation to do well and one item assessing effort, as follows: "I want to do well at this school"; "I take school seriously"; and "I pay attention in class." Affective engagement was measured by means of three items from Archambault et al. (2009) as follows: "I have fun at school"; "What we learn in class is interesting"; and, "I enjoy what we do at school." A preliminary confirmatory factor analysis supported a latent two-factor solution for motivational and affective engagement (chi square = 125.57, $df = 12$, $p < .001$, chi square/ $df = 10.47$, CFI = .97, RMSEA = .09), whereas a one-factor solution was not supported (chi square = 1163.13, $df = 14$, $p < .001$, chi square/ $df = 83.08$, CFI = .72, RMSEA = .26).

TABLE 1
Multigroup Comparisons for Testing of Measurement Invariance Between Unconstrained Model and Constrained Model by Gender

	<i>Chi sq</i>	<i>df</i>	<i>p</i>
Model 1			
Unconstrained model	842.41	188	.00
Model 2			
Constrained model by gender	862.24	204	.00
Model 1—Model 2 difference	19.83	16	.23

Smoking and drinking

The students were asked to report the extent to which they had smoked cigarettes in the past 30 days on a scale ranging from 1 (none at all) to 7 (40 times or more). They were also asked to report the number of occasions they had been drinking, ranging from 1 (never) to 7 (40 times or more). Smoking behavior was defined as smoking one or more times in the past 30 days, and alcohol drinking was defined as drinking alcohol one or more times in the past 30 days, in accordance with previous research (Simons-Morton, 2004). However, in order to investigate students who engage in smoking and drinking more frequently, another group was defined in terms of drinking or smoking more than 3 to 5 times in the past 30 days. Hence, this latter group excluded the group of students engaging in smoking and drinking less frequently (1–2 times past 30 days) or not at all. Previous research indicates that self-reported smoking and drinking is a valid estimate when confidentiality is ensured (Dolcini, Adler, & Ginsberg, 1996), as it is in the present study.

Data Analysis

In addition to the above-mentioned separate confirmatory factor analyses (CFA) of classroom achievement goal

structure and school engagement, an additional CFA was performed that included all of the variables in the same analysis. Test of configural invariance was also performed in order to investigate whether this measurement modal was valid across gender. Next, a multigroup structural equation model was developed to account for the hypothesized relationships between latent classroom achievement goal structure and school engagement, and gender-specific differences in these relations. Similarly to previous research (e.g., Gonida et al., 2009; Wang & Holcombe, 2010), perceived classroom achievement goal structures were set as predictor variables measuring school engagement. The latent measurement models of each variable provided the basis for computing unit-weighted composite scores, which are considered to be a valid method (Bobko, Roth, & Buster, 2007). These composite scores provided a foundation for correlations and descriptive statistics. Furthermore, intra-class correlation (ICC) and design effects were calculated. Next, the prevalence of smoking and drinking (smoking and drinking) by gender was described. Finally, bivariate and multiple logistic regression analyses were performed in order to investigate how the motivational variables (school engagement and classroom achievement goal structure) predicted smoking and drinking.

RESULTS

Measurement Model and Test of Configural Invariance

A confirmatory factor analysis (CFA) was produced in order to account for the latent factors of perceived classroom achievement goal structure (mastery, performance approach, and performance avoidance) and school engagement (motivational and affective) in one single analysis. This CFA produced acceptable model fit (chi square = 911.09,

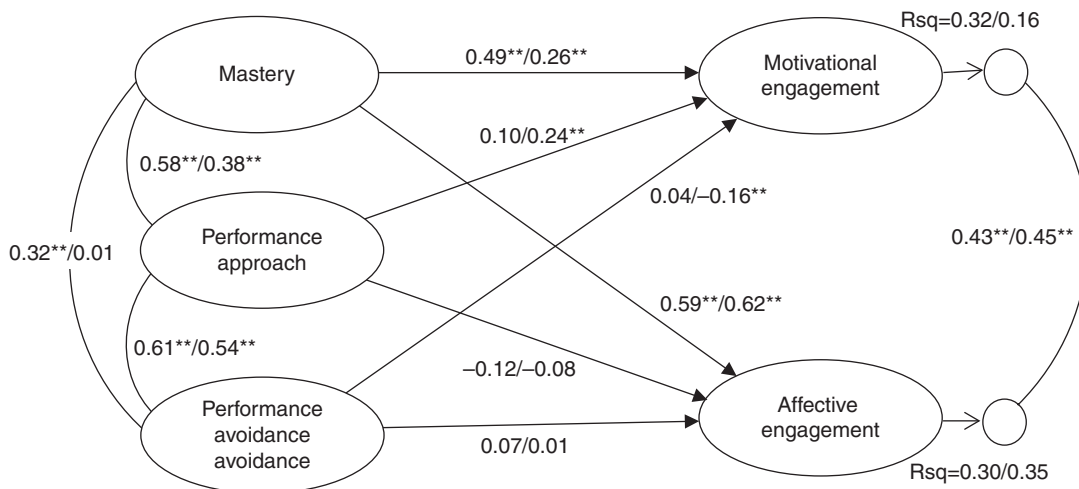


FIGURE 1 Latent achievement goal classroom structure and motivational engagement among boys/girls respectively.

TABLE 2

Bivariate Correlation (Boys Above Diagonal and Girls Below Diagonal) and Descriptives for Total Sample Including Mean (Range 1–5 for All Variables), Standard Deviance, Skewness, Kurtosis, and Alpha

	1	2	3	4	5
1. Mastery		.47**	.25**	.47**	.54**
2. Performance approach	.26**		.54**	.35**	.29**
3. Performance avoidance	-.04	.48**		.23**	.18**
4. Motivational engagement	.29**	.21**	-.02		.59**
5. Affective engagement	.50**	.15**	-.02	.50**	
Mean level total sample	3.72	3.55	2.99	4.02	3.37
Mean level difference boys-girls*	.01	.03	.17**	-.21**	.01
St. Dev.	.72	.77	.95	.70	.73
Skewness	-.64	-.36	-.01	-.91	-.35
Kurtosis	1.36	.71	-.13	2.03	.79
Alpha	.78	.82	.89	.82	.84

*Mean level (boys) subtracted by mean level (girls).

** $p < .01$.

$df = 194$, $p < .001$, $\chi^2/df = 4.70$, $CFI = .93$, $RMSEA = .05$). In order to test whether this model is equal across gender, a test of configural invariance was performed (Vandenberg & Lance, 2000). In this test, an unconstrained model was compared with a model in which factor loadings were constrained to be equal across gender. As shown in Table 1, the unconstrained model did not differ significantly from the constrained model (χ^2 difference = 19.83, df difference = 16, $p = .23$). Hence, configural invariance was supported for the current measurement model.

Structural Relationships

A structural equation model (SEM) was produced (Figure 1) in order to investigate relationships between the latent variables describing classroom achievement goal structures (mastery, performance approach, and performance avoidance) and school engagement (motivational and affective). This model was designed as a multigroup comparison between boys and girls.

The fit indexes for this model were acceptable ($\chi^2 = 842.41$, $df = 188$, $p < .001$, $\chi^2/df = 4.48$, $CFI = .93$, $RMSEA = .05$). This model showed that motivational engagement was significantly predicted by mastery classroom structure, and also by performance approach and performance avoidance among girls, but not among boys. Affective engagement was significantly predicted only by mastery goal structure. Furthermore, the

goal structure variables accounted for 23% of the variance in motivational engagement among boys, and 16% of motivational engagement among girls, whereas the goal structure variables accounted for 30% of the variance in affective engagement among boys and 35% of affective engagement among girls.

The parameter values were reported for boys and girls, respectively. Critical ratios for gender differences between parameters were assessed by means of z -scores according to the following guidelines: z -score $> 1.960 = p < .05$; z -score $> 2.326 = p < .02$; z -score $> 2.576 = p < .01$. These assessments showed that motivational engagement was more strongly predicted by mastery goal structure among boys than girls ($z = -2.932$, $p < .01$). Furthermore, motivational engagement was more strongly predicted by performance avoidance among girls than boys ($z = -2.271$, $p < .05$). The other parameters showed insignificant gender differences. Finally, gender differences in the covariance between the variables were analyzed, showing a stronger covariance among boys than girls between mastery and performance approach ($z = -4.048$, $p < .01$) and between mastery and performance avoidance ($z = -4.811$, $p < .01$). The other gender differences between the covariances were insignificant.

Correlations and Descriptive Statistics

Whereas the above model showed multivariate relations, Table 2 shows bivariate relationships of composite scores by gender, as well as descriptive statistics.

Motivational engagement had high kurtosis value because the majority of the respondents had a mean score of between 3 and 5. Hence, few students reported a low level of motivational engagement. In addition, the significant negative relationship between performance avoidance and motivational engagement among girls in the above-mentioned SEM (Figure 1) is probably due to a suppressor

TABLE 3
Prevalence of Smoking and Drinking (Smoking and Drinking)

	Boys n (%)	Girls n (%)
Smoking 1–2 times or more past 30 days	112 (17.45%)	102 (17.53%)
Smoking 3–5 times or more past 30 days	81 (12.62%)	67 (11.51%)
Drinking 1–2 times or more past 30 days	207 (32.34)	254 (43.71)
Drinking 3–5 times or more past 30 days	85 (13.28%)	91 (15.66%)

TABLE 4
Intraclass Correlation (ICC) and Design Effect (DEFF)

	ICC	DEFF
Mastery	.039	1.766
Performance approach	.031	1.650
Performance avoidance	.020	1.393
Motivational engagement	.031	1.650
Affective engagement	.029	1.570
Smoking 1–2 times or more past 30 days	.049	1.963
Smoking 3–5 times or more past 30 days	.050	1.982
Drinking 1–2 times or more past 30 days	.040	1.786
Drinking 3–5 times or more past 30 days	.019	1.373

effect (cf. Tabachnick & Fidell, 2007), as this relationship was insignificant in the subsequent correlation analysis (Table 2).

Analysis of mean level gender differences (*t*-test) showed that boys had a higher level of performance avoidance (mean difference = .17, *t* = 3.11, *p* < .01) and that girls had a higher level of motivational engagement (mean difference = -.21, *t* = -5.13, *p* < .01).

Prevalence of Smoking and Drinking

An analysis of smoking and drinking (Table 3) showed that approximately 17.5% of the total sample reported that they had smoked at least once over the past 30 days, and there were virtually no differences between boys and girls. However, more girls (43.71%) than boys (32.34%) reported drinking in the past 30 days. The prevalence of smoking and drinking 3 to 5 times or more in the past 30 days was also included in this table. These latter figures indicated virtually no gender differences.

Intraclass Correlations and Design Effects

Intraclass correlations (ICC) based on ANOVA and design effects (DEFF) were calculated (DEFF = 1 + (*m* - 1) × *p*, where *m* equals average group size, and *p* equals ICC (cf.

Donner & Klar, 2000) in order to investigate the amount of variance accounted for by class belongingness. The results (Table 4) showed that a small amount of variance was accounted for at the level of class belongingness, with design effect below two for all variables. Hence, all of the variables are largely accounted for at the individual level, and multilevel analysis is not advisable.

Logistic Regression

Bivariate odds-ratio tests (Table 5) for prediction of smoking and drinking showed significant effects for mastery achievement goal structure, motivational engagement, and affective engagement on all dependent variables. In addition, gender predicted drinking 1 to 2 times or more in the past 30 days.

In order to account for the relative importance of each motivational variable and gender as predictors of smoking and drinking, multiple logistic regression analyses were performed. More specifically, all of the variables showing significant (*p* < .01) odds-ratios in the bivariate logistic regression analysis (Table 5) were subjected to multivariate logistic regressions (multiple odds-ratio tests). These multiple logistic regression analyses (Table 6) showed that motivational engagement was significantly negatively related to both levels of smoking and drinking (1–2 times or more or 3–5 times or more past 30 days). In addition, gender remained as a predictor of drinking 1–2 times or more. Hence, girls had a higher odds-ratio of drinking even when controlling for the effect of the other predictors. Interaction effects of gender were controlled for, but this effect was insignificant. None of the classroom achievement goal variables remained as significant predictors of smoking and drinking in this multivariate analysis.

A subsequent stepwise backward elimination procedure, in which the independent variables with the poorest associations with smoking and drinking were eliminated, supported the findings displayed in Table 6, because motivational engagement remained the only predictor of smoking and drinking, with the exception of gender as

TABLE 5
Unadjusted Odds-Ratios (Confidence Interval 95%) for Smoking and Drinking by Classroom Goal Structure, and Motivational and Affective School Engagement

	Smoking 1–2 or more OR (95% CI)	Smoking 3–5 or more OR (95% CI)	Drinking 1–2 or more OR (95% CI)	Drinking 3–5 or more OR (95% CI)
Mastery	.81* (.66–1.00)	.70** (.55–.88)	.85* (.72–1.00)	.75** (.60–.93)
Perf. app.	.89 (.73–1.08)	.77* (.61–1.00)	1.03 (.89–1.21)	.87 (.70–1.07)
Perf. avoid.	.97 (.83–1.14)	.88 (.73–1.07)	1.07 (.94–1.21)	.97 (.82–1.15)
Motiv. engag.	.51** (.41–.62)	.45** (.36–.57)	.69** (.59–.82)	.51** (.41–.64)f
Aff. engag.	.61** (.50–.75)	.56** (.44–.71)	.79** (.68–.93)	.60** (.48–.74)
Gender	1.01 (.75–1.35)	.90 (.64–1.27)	1.63** (1.29–2.05)	1.21 (.88–1.67)

***p* < .01 * *p* < .05.

TABLE 6
Multiple Odds-Ratios (Confidence Interval 95%) for Smoking and Drinking

	<i>Smoking</i> 1–2 or more OR (95% CI)	<i>Smoking</i> 3–5 or more OR (95% CI)	<i>Drinking</i> 1–2 or more OR (95% CI)	<i>Drinking</i> 3–5 or more OR (95% CI)
Mastery 1.20 (93–1.55)	1.03 (.76–1.41)	1.03 (.84–1.25)	1.09 (.83–1.42)	
Motiv. engag.	.49** (.38–.64)	.44** (.32–.60)	.64** (.52–.80)	.53** (.41–.70)
Aff. engag.	.83 (.63–1.09)	.89 (.64–1.24)	.97 (.78–1.21)	.83 (.62–1.11)
Gender	–	–	1.86** (1.45–2.38)	–

** $p < .01$.

additional predictor for drinking 1–2 times or more in the past 30 days.

DISCUSSION

The purpose of the present study was to investigate the relationships between classroom achievement goal structures and school engagement, to investigate how classroom achievement goal structures and school engagement may predict smoking and drinking in terms of smoking and drinking, and finally to explore gender differences regarding these issues.

The results from the multivariate analysis (SEM) showed that both motivational and affective engagement were predicted primarily by mastery goal structure: Students who perceive the classroom as mastery oriented have a higher level of school engagement, thus supporting Hypothesis 1. This is in accordance with findings in previous research (Gonida & Kiosseoglou, 2009; Pintrich, 2000). Achievement goal structures may influence students' engagement due to an impact on their confidence to master academic tasks (Roeser et al., 2000), and students who perceive their teachers' advance of mastery goals may be more motivated to learn and engage in deeper cognitive processing (Meece, Blumenfield, & Hoyle, 1988). Mastery goals foster students' sense of competence by emphasizing learning and development rather than external normative standards of performance (Wang & Holcombe, 2010), thus providing students with more opportunities to feel successful (Linnenbrink & Pintrich, 2002). Moreover, the present findings showed that mastery goals predicted both types of school engagement in a multivariate model, which supports the multidimensionality of school engagement.

However, motivational engagement, but not affective engagement, was significantly more strongly predicted by achievement goal structures among boys than girls. Hence, boys may associate their motivational engagement more strongly with perceived classroom structure, particularly with mastery goal structure. Furthermore, the correlation analysis showed that mastery goal structure was more strongly related to perceived performance goal structures (approach and avoidance) among boys than girls. Hence,

boys appear to link mastery goal structure more strongly both to other aspects of the goal structure (performance approach or avoidance) and to school engagement. A possible reason for this is that boys may not differentiate between perceptions of different goal structures as compared to girls. A well-known finding in achievement goal research is the positive correlation between all of the goals, as well as between approach and avoidance goals (e.g., Dinger, Dickhäuser, Spinath, & Steinmayr, 2013). The current findings suggest that this phenomenon may be even more prevalent among boys than among girls.

Performance avoidance was significantly correlated with motivational engagement among boys, but not among girls. In addition, boys had a higher mean level score of perceived performance avoidance goal structure compared to girls. Taken together, these results are in accordance with the conclusion that performance goals may be more important for boys (cf. Linnenbrink-Garcia et al., 2008), and the present study suggests that performance-avoidance may have a particularly important role regarding these gender differences. Performance avoidance may actually be beneficial for boys, because they relate this goal positively to motivational engagement.

The results also showed that both aspects of school engagement were negatively related to substance use in terms of smoking and drinking, thus supporting Hypothesis 2. This finding is in accordance with previous research, which concludes that higher school engagement may protect against drinking initiation because it is inconsistent with antisocial attitudes and behaviors such as precocious drinking (Simons-Morton, 2004). This is also in accordance with social control theory, which assumes that lack of commitment to conventional goals increases the risk of substance use (Hawkins & Weis, 1985). Finally, this finding may be accounted for by problem behavior theory, which claims that adolescents who devalue academic achievement orientation are more at risk for substance use (Jessor et al., 1991). As such, the present results regarding the relations between perceived classroom achievement goals and school engagement in the current Norwegian sample are comparable to previous findings in international research.

The present study also showed that perception of a mastery goal structure was negatively related to smoking

and drinking. This is in accordance with experimental studies, which has suggested that changes in the school social environment that increase student participation, improve relationships, and promote a positive school ethos may be associated with reduced drug use (Fletcher et al., 2008). However, the linkage between mastery goal structure and smoking and drinking disappeared in the multivariate logistic regression analysis, probably because mastery goal structure was highly associated with both aspects of school engagement. In fact, the multivariate logistic regression analysis showed that only motivational engagement remained as a significant predictor of smoking and drinking, in addition to gender (drinking 1–2 times or more in the past 30 days). Hence, being a girl appears to represent an independent risk factor for drinking 1 to 2 times or more in the past 30 days, even when controlling for the effect of school engagement and perceived classroom goal structure. However, there were no gender differences regarding the relationships between motivational variables (classroom goal structure and school engagement) and smoking and drinking.

Whereas the finding that girls are somewhat more likely to report drinking 1–2 times in the past 30 days is in accordance with previous findings in the Norwegian adolescent population (Skretting & Bye, 2003), it is somewhat contrary to a study of British adolescents, which showed that boys are more likely to engage in drinking and smoking than girls (Rodham et al., 2005). Moreover, a study of a nationally representative sample of American adolescents (8th-, 10th-, and 12th-grade students) showed virtually no gender differences in smoking and drinking (Wallace et al., 2003). A recent international survey on health behavior among adolescents in 38 European countries showed that 15-year-old boys were more likely to engage in smoking and drinking than girls in most countries, whereas the gender differences were small for the Nordic countries (Currie et al., 2012). This report also showed a lower prevalence of smoking and drinking among 15-year-old adolescents in the Nordic countries (particularly Norway) than most other European countries. In conclusion, previous international studies on gender differences in the prevalence of smoking and drinking show somewhat mixed results.

Limitations, Implications, and Conclusion

It is important to note that the present study measured classroom achievement goal structures in terms of how they are perceived by the students. Whereas there may be reasons to expect that students in the same class will share some experience of the classroom goals, the present results showed that the intraclass correlations and design effects were low, indicating that these variables are accounted for at the individual level. But these findings are also in accordance with previous research, which has shown

intraclass correlations for students' perceived school environment, including classroom achievement goal structure, as low as 2–5% (Wang & Holcombe, 2010). Because the current results and previous research findings show that classroom achievement goal structure is primarily accounted for at the student level, it may be important to identify students with a low level of mastery classroom perceptions. These students may be given help to identify aspects of the classroom experience that offer possibilities for mastery experiences. This point appears to be particularly important for boys, who relate their motivational school engagement more strongly to their perceived classroom goal structure.

In addition to students' individual perceptions of classroom achievement goals, the present results also showed that these goals are related to school engagement. Hence, teachers may support school engagement by emphasizing self-improvement and individual mastery in the school environment. In order to achieve this, it may be equally important to avoid heavy emphasis on competition, comparison, and pursuit of high grades or test scores, which may decrease students' sense of connection with their schools (Wang & Holcombe, 2010).

However, the current study does not assume causality, because this would require in addition a longitudinal design and experimental control. Nevertheless, it supported a multidimensional model of the motivational constructs, and the particular importance of perceived mastery classroom goal structure as predictor of school engagement, particularly as predictor of motivational engagement among boys. Low school engagement, particularly motivational engagement, seems to be an important indicator of the extent to which students engage in problem behavior. Hence, the present study may be of importance for professionals who are concerned about motivational factors related to detrimental behaviors in terms of smoking and drinking. However, future research should investigate the longitudinal relationships between perceived classroom achievement goal structure, school engagement, and detrimental behavior in order to investigate causal relationships between these variables.

The present study investigated the role of classroom achievement goal structure and school engagement as predictors of substance use in terms of smoking and drinking. However, there may be a range of other risk factors, such as delinquency, crime, violence, and academic problems (Catalano et al., 2004) that should also be included in future research on the importance of motivational factors at school. In addition, it would be interesting to investigate alternative predictors of motivational engagement in addition to achievement goal structures. For example, it is likely to assume that students who have not done well in school previously may express disengagement from school, and future research may investigate this issue.

Despite these limitations, the present study supports the assumption that school engagement is a multi-dimensional phenomenon that may be predicted by perceived classroom goal structure, in particular mastery goal structure. However, smoking and drinking is more consistently predicted by school engagement, particularly motivational engagement, than by perceived classroom goal structure. Hence, smoking and drinking appears to be more associated with the students' personal motivation than their perception of the learning environment. Finally, gender differences are of some importance with respect to the relationships between achievement goal structures and school engagement, but also as a risk factor for engaging in detrimental behavior in terms of alcohol consumption.

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REFERENCES

- Anderman, E. M., & Midgley, C. (1997). Changes in achievement goal orientations, perceived academic competence, and grades across the transition to middle level schools. *Contemporary Educational Psychology, 22*, 269–298.
- Archambault, I., Janosz, M., Fallu, J. S., & Pagani, L. S. (2009). Student engagement and its relationship with early high school dropout. *Journal of Adolescence, 32*, 651–670.
- Bobko, P., Roth, P. L., & Buster, M. A. (2007). The usefulness of unit weights in creating composite scores: A literature review, application to content validity, and meta analysis. *Organizational Research Methods, 10*, 689–709.
- Blondal, K. S., & Adalbjarnardottir, S. (2012). Student disengagement in relation to expected and unexpected educational pathways. *Scandinavian Journal of Educational Research, 56*, 85–100.
- Bond, L., Butler, H., Thomas, L., Carlin, J., Glover, S., Bowes, G., & Patton, G. (2007). Social and school connectedness in early secondary school as predictors of late teenage substance use, mental health, and academic outcomes. *Journal of Adolescent Health, 40*, 9–18.
- Carter, M., McGee, R., Taylor, B., & Williams, S. (2007). Health outcomes in adolescence: Associations with family, friends and school engagement. *Journal of Adolescence, 30*, 51–62.
- Caraway, K., Tucker, C. M., Reinke, W. M., & Hall, C. (2003). Self-efficacy, goal orientation, and fear of failure as predictors of school engagement in high school students. *Psychology in the Schools, 40*, 417–427.
- Catalano, R. F., Oesterle, S., Fleming, C. B., & Hawkins, J. D. (2004). The importance of bonding to school for healthy development: Findings from the Social Development Research Group. *Journal of School Health, 74*, 252–261.
- Chen, J. J. L. (2005). Relation of academic support from parents, teachers, and peers to Hong Kong adolescents' academic achievement: The mediating role of academic engagement. *Genetic, Social, and General Psychology Monographs, 131*, 77–127.
- Conrad, K. M., Flay, B. R., & Hill, D. (1992). Why children start smoking cigarettes: Predictors of onset. *British Journal of Addiction, 87*, 1711–1724.
- Currie, C., Zanotti, C., Morgan, A., Currie, D., de Looze, M., Roberts, C., Samdal, O., Smith, O. R. F., & Barnekow, V. (2012). *Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey*. Copenhagen, WHO Regional Office for Europe, 2012 (Health Policy for Children and Adolescents, No. 6).
- Deci, E., & Ryan, R. M. (2000). What is the self in self-directed learning? Findings from recent motivational research. In G. Staka (Ed.), *Conceptions of self-directed learning: Theoretical and conceptual considerations*. Munster, Germany: Waxmann.
- Dinger, F. C., Dickhäuser, O., Spinath, B., & Steinmayr, R. (2013). Antecedents and consequences of students' achievement goals: A mediation analysis. *Learning and Individual Differences, 28*, 90–101.
- Dolcini, M. M., Adler, N. E., & Ginsberg, D. (1996). Factors influencing agreement between self-reports and biological measures of smoking among adolescents. *Journal of Research on Adolescence, 6*, 515–542.
- Donner, A., & Klar, N. (2000). *Design and analysis of cluster randomization trials in health research* (pp. 81–82). London, England: Arnold.
- Elliot, A. J., & Fryer, J. W. (2008). The goal construct in psychology. In J. Y. Shah & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 235–250). New York, NY: Guilford Press.
- Estell, D. B., & Perdue, N. H. (2013). Social support and behavioral and affective school engagement: The effects of peers, parents, and teachers. *Psychology in the Schools, 50*, 325–339.
- Flay, B. R., Ockene, J. K., & Tager, I. B. (1992). Smoking: Epidemiology, cessation, and prevention. *Chest, 102*, 277S–301S.
- Fletcher, A., Bonell, C., & Hargreaves, J. (2008). School effects on young people's drug use: A systematic review of intervention and observational studies. *Journal of Adolescent Health, 42*, 209–220.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74*, 59–109.
- Garvik, M., Idsoe, T., & Bru, E. (2014). Depression and school engagement among Norwegian upper secondary vocational school students. *Scandinavian Journal of Educational Research, 58*, 592–608.
- Gonida, E. N., Voulala, K., & Kiosseoglou, G. (2009). Students' achievement goal orientations and their behavioral and emotional engagement: Co-examining the role of perceived school goal structures and parent goals during adolescence. *Learning and Individual Differences, 19*, 53–60.
- Hawkins, J. D., & Weis, J. G. (1985). The social development model: An integrated approach to delinquency prevention. *Journal of Primary Prevention, 6*, 73–97.
- Hirshi, T. (1969). *Causes of delinquency*. Berkeley, CA: University of California Press.
- Jessor, R., Donovan, J. E., & Costa, F. (1991). *Beyond adolescence: Problem behavior and young adult development*. New York, NY: Cambridge University Press.
- Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *California School Psychologist, 8*, 7–27.
- Lam, S. F., Jimerson, S., Wong, B. P., Kikas, E., Shin, H., Veiga, F. H., ... Zollneritsch, J. (2014). Understanding and measuring student engagement in school: The results of an international study from 12 countries. *School Psychology Quarterly, 29*, 213.

- Linnenbrink, E. A., & Pintrich, P. R. (2002). Achievement goal theory and affect: An asymmetrical bidirectional model. *Educational Psychologist, 37*, 69–78.
- Linnenbrink-Garcia, L., Tyson, D. F., & Patall, E. A. (2008). When are achievement goal orientations beneficial for academic achievement? A closer look at moderating factors. *International Review of Social Psychology, 21*, 19–70.
- McGinnis, J. M., & Foege, W. H. (1993). Actual causes of death in the United States. *Journal of the American Medical Association, 270*, 2207–2212.
- Meece, J. L., Blumenfeld, P. C., & Hoyle, R. H. (1988). Students' goal orientations and cognitive engagement in classroom activities. *Journal of Educational Psychology, 80*, 514–523.
- Midgley, C., Maehr, M. L., Hruda, L. Z., Anderman, E., Anderman, L., Freeman, K. E., . . . Urdan, T. (2000). *Manual for the patterns of adaptive learning scales (PALS)*. Ann Arbor, MI: University of Michigan.
- Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation: Theory, Research and Application* (pp. 451–502). San Diego, CA: Academic Press.
- Pyper, J. R., Freiberg, H. J., Ginsburg, M., & Spuck, D. W. (1987). *Instruments to measure teacher, parent, and student perceptions of school climate*. Bloomington, IN: Phi Delta Kappa.
- Resnick, M. D., Bearman, P. S., Blum, R. W., Bauman, K. E., Harris, K. M., Jones, J., . . . Udry, J. R. (1997). Protecting adolescents from harm: Findings from the National Longitudinal Study on Adolescent Health. *Journal of the American Medical Association, 278*, 823–832.
- Ringwalt, C., Pankratz, M., Gottfredson, N., Jackson-Newsom, J., Dusenbury, L., Giles, S., . . . Hansen, B. (2009). The effects of students' curriculum engagement, attitudes toward their teachers, and perceptions of their teachers' skills on school-based prevention curriculum outcomes. *Journal of Drug Education, 39*, 223–237.
- Roberts, C., Freeman, J., Samdal, O., Schnohr, C. W., De Looze, M. E., Gabhainn, S. N., . . . Rasmussen, M. (2009). The Health Behaviour in School-Aged Children (HBSC) study: Methodological developments and current tensions. *International Journal of Public Health, 54*, 140–150.
- Rodham, K., Hawton, K., Evans, E., & Weatherall, R. (2005). Ethnic and gender differences in drinking, smoking and drug taking among adolescents in England: A self-report school-based survey of 15 and 16 year olds. *Journal of Adolescence, 28*, 63–73.
- Roeser, R., Eccles, J., & Sameroff, A. (2000). School as a context of early adolescents' academic and social-emotional development: A summary of research findings. *Elementary School Journal, 100*, 443–471.
- Sagatun, Å., Heyerdahl, S., Wentzel-Larsen, T., & Lien, L. (2014). Mental health problems in the 10th grade and non-completion of upper secondary school: The mediating role of grades in a population-based longitudinal study. *BMC Public Health, 14*, 16.
- Samdal, O., Bye, H. H., Torsheim, T., Birkeland, M. S., Diseth, Å. R., Fismen, A. S., Haug, E., Leversen, I., & Wold, B. (2012). *Sosial ulikhet i helse og læring blant barn og unge: Resultater fra den land-srepresentative spørreskjemaundersøkelsen «Helsevaner blant skoleleelver: En WHO-undersøkelse i flere land»* HEMIL-rapport 2/2012. Bergen, Norway: HEMIL-senteret, Universitetet i Bergen.
- Samdal, O., Wold, B., Klepf, K. I., & Kannas, L. (2000). Students' perception of school and their smoking and alcohol use: A cross-national study. *Addiction Research & Theory, 8*, 141–167.
- Simons-Morton, B. (2004). Prospective association of peer influence, school engagement, drinking expectancies, and parent expectations with drinking initiation among sixth graders. *Addictive Behaviors, 29*, 299–309.
- Simons-Morton, B. G., & Crump, A. D. (2003). Association of parental involvement and social competence with school adjustment and engagement among sixth graders. *Journal of School Health, 73*, 121–126.
- Simons-Morton, B., & Chen, R. (2009). Peer and parent influences on school engagement among early adolescents. *Youth & Society, 41*, 3–25.
- Skaalvik, E. M., & Skaalvik, S. (2013). School goal structure: Associations with students' perceptions of their teachers as emotionally supportive, academic self-concept, intrinsic motivation, effort, and help seeking behavior. *International Journal of Educational Research, 61*, 5–14.
- Skretting, A., & Bye, E. K. (2003). *Bruk av rusmidler blant norske 15–16 åringer* [Substance use among Norwegian adolescents aged 15–16 years] SIRUS report no. 5. Oslo, Norway: Statens institutt for rusmiddelforskning.
- Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. New York, NY: Harper Collins.
- Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations in organizational research. *Organizational Research Methods, 3*, 4–70.
- Wallace, J. M., Bachman, J. G., O'Malley, P. M., Schulenberg, J. E., Cooper, S. M., & Johnston, L. D. (2003). Gender and ethnic differences in smoking, drinking and illicit drug use among American 8th, 10th and 12th grade students, 1976–2000. *Addiction, 98*, 225–234.
- Wang, M.-T., & Fredricks, J. A. (2014). The reciprocal links between school engagement, youth problem behaviors, and school dropout during adolescence. *Child Development, 85*, 722–737.
- Wang, M. T., & Holcombe, R. (2010). Adolescents' perceptions of school environment, engagement, and academic achievement in middle school. *American Educational Research Journal, 47*, 633–662.
- Winkleby, M. A., Fortmann, S. P., & Rockhill, B. (1993). Health-related risk factors in a sample of hispanics and whites matched on sociodemographic characteristics: The Stanford five-city project. *American Journal of Epidemiology, 137*, 1365–1375.
- Wolters, C. A. (2004). Advancing achievement goal theory: Using goal structures and goal orientations to predict students' motivation, cognition, and achievement. *Journal of Educational Psychology, 96*, 236–250.