Depressive Symptoms Anticipate Changes in the Frequency of Alcohol Intoxication Among Low-Accepted Adolescents

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ABSTRACT. Objective: There is strong evidence that depression anticipates later drinking problems among adults. These associations have not been consistently documented during adolescence, perhaps because little attention has been given to individual differences in peer relationships, which are the primary setting for adolescent alcohol consumption. This study investigated associations between depressive affect and alcohol misuse as moderated by peer group acceptance. **Method:** A community sample of 1,048 Swedish youth provided self-reports of depressive symptoms and intoxication frequency at annual intervals across the middle school years (seventh grade: $M = 13.21$ years old; eighth grade: $M = 14.27$ years old; ninth grade: $M = 15.26$ years old). Peer nomina-

tions provided a measure of individual acceptance. **Results:** Growth curve analyses revealed differences in the extent to which initial levels of depressive symptoms predicted the slope of increase in intoxication frequency. Higher levels of depressive symptoms at the outset anticipated sharp increases in intoxication frequency from seventh to ninth grades for low-accepted youth but not for average- or high-accepted youth. **Conclusions:** Poor peer relations and depressive affect are vulnerabilities that set the stage for escalating adolescent alcohol misuse. Across the middle school years, when most youth have their first experiences with alcohol, peer difficulties exacerbated the tendency of depressed youth to drink to excess. (*J. Stud. Alcohol Drugs*, 76, 585–593, 2015)

ALCOHOL MISUSE OFTEN ACCOMPANIES depression (Conner et al., 2009). Among adults, there is strong evidence that depression anticipates later drinking problems, especially for those with interpersonal difficulties (Peirce et al., 2000). Similar longitudinal patterns have not been consistently documented during adolescence, perhaps because little attention has been given to individual differences in social relationships (see Chassin et al., 2009, for review). In the present study, we tested the hypothesis that poor peer relations exacerbate the tendency of adolescents with elevated depressive symptoms to misuse alcohol. Using a community sample of Swedish middle school students, we examined prospective associations between depressive symptoms at age 13 and changes in the rate of alcohol intoxication from ages 13 to 15, contrasting youth who are and are not liked by peers.

Alcohol consumption in Western cultures typically begins sometime during the second decade of life. Most youth consume their first alcoholic beverage during middle adolescence, with a steady increase in drinking during the years that follow (Windle, 2003). Drinking to intoxication is a common form of alcohol misuse during adolescence. By age 15, 40% of adolescents report having been intoxicated at

least once during the past month (Johnston et al., 2003). The costs associated with alcohol intoxication are considerable. The misuse of alcohol during adolescence has been tied to accidents (many fatal), depression, suicide, violence, and the spread of infectious diseases (Boden & Fergusson, 2011). Furthermore, the timing of alcohol use initiation coincides with a jump in depressive symptoms. The prevalence of major depressive disorders increases from 2% during childhood to 15%–20% during adolescence, with most of the increase coming between ages 11 and 15 (Graber & Sontag, 2009). This means that alcohol consumption begins at the same time that a number of youth are struggling with the debilitating onset of affective disorders.

Among adults, numerous studies have found that depression predicts subsequent increases in alcohol use disorders (Conner et al., 2009). This pattern has not been reliably replicated in adolescent samples. Some studies find that depressive symptoms anticipate increases in alcohol consumption (e.g., Mackie et al., 2011; Marmorstein, 2009), but at least four separate inquiries found no evidence of alcohol misuse among certain adolescents with elevated depressive symptoms (Chassin et al., 2002; Fleming et al., 2008; Hussong et al., 1998; Marmorstein et al., 2010; Needham, 2007). These findings raise questions about the degree to which models developed to explain alcohol use during adulthood generalize to adolescents.

Affect-regulation models are central to accounts that explain how adult depression leads to alcohol misuse. Self-medication occurs when an individual drinks in response to stress or distress, in an effort to regulate negative affect, a practice that is reinforced by the tension-reducing properties of alcohol (Cappell & Greeley, 1987; Conger, 1956). The

Received: August 5, 2014. Revision: February 16, 2015.

Brett Laursen received support from the U.S. National Institute of Mental Health (MH58116) and the U.S. National Science Foundation (0923745, 0909733). Support for the *10 to 18 Project* was provided to Margaret Kerr and Håkan Stattin by the Swedish Research Council. The authors are grateful to Dawn DeLay for assistance with the analyses.

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absence of over-time associations between depression and drinking may be an indication that affect-regulation models are not applicable to adolescents, as youth cannot readily acquire and consume alcohol when they are unhappy (Zucker, 1986).

We take a somewhat different view. Adolescent alcohol consumption is usually confined to peer settings, where there is pressure on everyone to consume (Bot et al., 2005). Opportunity constraints and conformity demands may obscure the link between adolescent depressive affect and alcohol misuse. This suggests that elevated depressive symptoms should anticipate problem drinking for youth who are self-medicating but not for those who drink for other reasons. Youth who are not accepted by peers may turn to alcohol when unhappy, in contrast to their socially successful age-mates, who have access to interpersonal coping resources. A study of emerging adults supports the proposition that peer relations moderate the tendency to self-medicate, with the strongest associations among those with the lowest quality friendships (Hussong et al., 2001).

The present study uses peer acceptance as a marker of adolescent relationship quality. Acceptance describes the degree to which a child is liked by peers, indexed by the number of times he or she is nominated as a friend or affiliate. Although no previous studies have examined the possibility that peer relations moderate longitudinal links from depressive symptoms to alcohol misuse, there is evidence that associations involving other variables that predict alcohol intoxication vary as a function of peer reputation. For instance, aggressive youth with low sociometric status are considerably more likely to drink to intoxication than aggressive youth with high sociometric status (Prinstein & La Greca, 2004).

We used a multiple-group, multivariate, latent-trajectory growth model to address the hypothesis that peer acceptance moderates the over-time association between depressive symptoms and intoxication frequency. We predicted that prospective ties from depressive symptoms at age 13 to the rate of increase in the frequency of alcohol intoxication from ages 13 to 15 would be stronger for low-accepted youth than for average- and high-accepted youth. To rule out the possibility that comorbid behavior problems drive the association between depressive affect and substance use (Miller-Johnson et al., 1998), delinquency and impulsivity were included as covariates.

Method

Participants

The final sample of 1,048 participants was drawn from the *10 to 18 Project*, a longitudinal study of all students attending school in a small city in Sweden. The present study focused on students from the three secondary schools (seventh to ninth

grades). At the outset, there were 500 girls and 548 boys in the seventh grade (range: 12–15 years, $M = 13.21$, $SD = 0.44$). More than 91% of the sample were ethnic Swedes ($n = 954$). About 75% of parents completed high school or vocational school; the remainder either held a university degree (23%) or did not complete high school (2%).

Instruments

Trained research assistants administered questionnaires during regular school hours. Teachers were not present. Data were collected at annual intervals during the spring semester.

Alcohol intoxication frequency. Participants completed a problem behavior inventory with documented validity among Swedish youth (Magnusson et al., 1975). The scale assessing intoxication frequency included one item referring to alcohol misuse during the past year and two items referring to alcohol misuse during the past month (e.g., During the past year, have you drunk so much beer, liquor or wine that you got drunk? During the past month, did you drink until you got drunk with your best friend/peer group?). Items were scored on a 1 (*no, it has not happened*) to 3 (*several times*) scale and averaged (seventh grade: $M = 1.13$, $SD = 0.36$; eighth grade: $M = 1.31$, $SD = 0.55$; ninth grade: $M = 1.59$, $SD = 0.71$). Approximately 16.3% of participants reported alcohol intoxication in seventh grade, 33% did so in eighth grade, and 52.5% did so in ninth grade. Internal reliability was high ($\alpha = .84-.89$).

In general, adolescent self-reports of subjective levels of problem drinking have demonstrated validity (Smith et al., 1995). In previous studies, the annual incidence item from the present scale (phrased as lifetime incidence), administered to 14- to 16-year-old Swedish youth, was tied to objective concurrent measures of problem drinking (Magnusson et al., 1975) and to prospective measures of problem drinking at ages 18–24. This was indicated by police records for public drunkenness and driving under the influence, as well as by public health records for the diagnosis and treatment of alcohol use disorders (Andersson & Magnusson, 1988). The 1-year test–retest reliability of the alcohol intoxication frequency scale was acceptable ($r = .72$).

Depressive symptoms. Adolescents completed a 16-item version of the Child Depressive Symptoms Scale from the Center for Epidemiological Studies (Radloff, 1977). Adolescents reported how often they experienced depressive symptoms during the past week (e.g., worried about things that I don't usually worry about). Items were scored on a 1 (*not at all*) to 4 (*often*) scale and averaged (seventh grade: $M = 1.77$, $SD = 0.61$; eighth grade: $M = 1.79$, $SD = 0.62$; ninth grade: $M = 1.83$, $SD = 0.63$). Internal reliability was high ($\alpha = .81-.87$). Rates of clinical depression (using a cutoff score of 30) ranged from 12.3% to 13.6%.

Peer acceptance. Participants identified up to three important peers, defined as “someone you talk with, hang

out with, and do things with.” Each was labeled *friend*, *romantic partner*, or *sibling*. Participants also nominated peer associates: up to 10 individuals with whom they spent time in school and up to 10 individuals with whom they spent time out of school. Important peers and peer associates could be older or younger, boys or girls, from the same school or a different school, but not parents or other adults. Peer acceptance represented the sum of the friend nominations an individual received in the seventh grade ($M = 4.59$, $SD = 2.64$). For multiple-group contrasts, participants were classified into high-accepted (0.75 SD above the mean, $n = 225$, $M = 8.46$), average-accepted (between 0.75 SD below the mean and 0.75 SD above the mean, $n = 589$, $M = 4.37$), and low-accepted (0.75 SD below the mean, $n = 234$, $M = 1.42$) groups.

Control variables. The problem behavior inventory (Magnusson et al., 1975) also included 18 items measuring delinquency (Laursen et al., 2012). Items (e.g., Have you shoplifted?) were rated on a scale from 1 (*no, it has not happened*) to 5 (*more than 10 times*) and averaged (seventh grade: $M = 1.10$, $SD = 0.26$). Internal reliability was high ($\alpha = .84-.89$). Parents completed a three-item questionnaire describing the adolescent’s impulsivity (e.g., often has difficulty waiting for his or her turn). Items were drawn from the hyperactive/impulsive subscale in the widely used SNAP (Swanson, Nolan, and Pelham)-IV questionnaire, which measures attention-deficit/hyperactivity disorder symptoms as specified in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (American Psychiatric Association, 1994; Swanson et al., 2001). Data were collected from parents every other year via questionnaires mailed home. Therefore, impulsivity reports were available from 497 parents in seventh grade and 221 parents in eighth grade. Items were scored on a scale from 1 (*does not apply at all*) to 4 (*applies very well*) and averaged ($M = 1.89$, $SD = 0.65$). Internal reliability was good ($\alpha = .72-.77$), and the 2-year test-retest reliability was acceptable ($r = .74-.76$). Last, friend intoxication frequency consisted of the intoxication frequency scores for the first same-sex nominated peer who was labeled as a friend.

Procedure

Students were recruited in classrooms during school hours. They were informed that participation was voluntary and were assured that answers would not be shared with parents, teachers, or police. Parents were informed about the study through community and school meetings and through the mail. Parents received a postage-paid card to return if they did not wish to have their child participate in the study, and approximately 1% did so. Parents and students were informed that they were free to end participation in the study at any time. The study was approved by a local human subjects review board.

Three waves of data were collected from three successive cohorts of seventh graders. Across cohorts, there were 1,052 adolescents enrolled in the seventh grade; only 4 declined to participate. Of the 1,048 participants, 836 had complete data at all three time points, 149 had complete data at two time points, and 63 had complete data at only one time point. There were no statistically significant differences on any demographic or study variables between those who participated in three, two, or one time points; nor were there differences between those with parental reports in the seventh grade, those with parental reports in the eighth grade, and those with no parental report data. All data were missing completely at random, $\chi^2(63, N = 1,048) = 81.01$, $p > .05$. Full-information maximum-likelihood procedures were used to handle missing data. The same pattern of results emerged from analyses restricted to those with three complete waves of child-report data and those with seventh-grade parental report data.

Plan of analysis

A structural equation model framework with Mplus 5.2 (Muthén & Muthén, 1998–2005) was used to fit growth curve models. Intraindividual change was modeled with factor loadings at each time point, estimating the latent factors of the intercept (mean levels) and the slope (change over time). Latent constructs were based on three annual measurements. Intercept loadings were set at 1, and slope loadings were set at fixed intervals (0, 1, and 2). Residuals were constrained to be equal across time and uncorrelated; the model fit and results remained the same when the residuals were unconstrained and correlated. Scores for alcohol intoxication frequency and depressive symptoms were positively skewed. Models were fit using the MLR estimator, which provides standard errors and fit statistics that are robust to nonnormality (Muthén & Muthén, 1998–2005). Similar findings emerged without the estimator. Results are described in terms of standardized beta weights (or correlations, in the case of associations involving covariates). Although associations between the intercept and the slope of the same variable cannot be interpreted, they must be included to calculate intercept values (Ram & Grimm, 2007).

Univariate multiple-group growth curve models from Grade 7 to Grade 9 were created for alcohol intoxication frequency and depressive symptoms. The results describe the intercept and mean trajectory of each variable, separately for low-accepted, average-accepted, and high-accepted youth. These models did not include covariates.

A step-wise procedure was used to fix and release acceptance group constraints on model parameters (Bollen & Curran, 2006). In the first step, associations between the intercepts and the slopes of depressive symptoms and alcohol intoxication frequency were modeled with a dual process growth model (Fleming et al., 2008), also known as a mul-

tivariate latent-trajectory model (Curran & Hussong, 2003). A multiple-group growth model with no constraints was fit to the data, followed by models in which one of the two intercept-to-slope paths was constrained to be equal across acceptance groups. Chi-square difference tests compared model fit statistics to determine whether constraints should be retained in these regression paths. Chi-square difference tests then compared means, variances, and covariances, as well as the remaining regression paths, across low-accepted, average-accepted, and high-accepted youth. Follow-up chi-square difference tests compared two acceptance groups at a time. Chi-square values were scaled (Satorra & Bentler, 2001).

Delinquency, impulsivity, and friend intoxication frequency were included in each multivariate model as manifest variables to control for the comorbidity of depression and externalizing problems. In the next step, control variable correlations were constrained to be equal across acceptance groups, and model fit was compared with a model in which these correlations were unconstrained. The final model retained correlated paths between the control variables and the intercepts of depressive symptoms and intoxication frequency. Model fit was unacceptable when paths from the control variables to the slopes of depressive symptoms and intoxication frequency were included. The paths were not statistically significant, and therefore they were omitted from the final model. The same pattern of statistically significant results emerged in models without control variables. Supplemental analyses also included schools (dummy coded) as a control variable. There were no statistically significant paths involving schools, and model fit worsened with the inclusion of this variable; therefore, it was omitted from the final model. To determine the moderating effects of gender and other factors, multiple-group models—conducted separately for low-accepted, average-accepted, and high-accepted groups—compared regression paths across boys and girls, as well as across adolescents who were above and below average on impulsivity, above and below average on delinquency, and above and below average on friend intoxication frequency. Model fit was unacceptable when the gender, impulsivity, delinquency, and friend intoxication frequency moderators were included, suggesting that there were no path differences as a function of these variables. The same pattern of statistically significant findings emerged with a two-item intoxication frequency scale that assessed consumption during the past month only.

Statistically significant intercept-to-slope associations were followed with simple slopes analyses to estimate the slope of the outcome variable at different initial levels of the predictor variable (Preacher et al., 2006). Slopes for outcome variables were estimated at high (1 *SD* above the mean), medium (the mean), and low (1 *SD* below the mean) conditional intercept values.

TABLE 1. Means, standard deviations, and range of scores for study variables

Variable	<i>M</i>	<i>SD</i>	Min.	Max.
Intoxication frequency				
Grade 7	1.12	0.36	1.00	3.00
Grade 8	1.31	0.55	1.00	3.00
Grade 9	1.59	0.71	1.00	3.00
Depressive symptoms				
Grade 7	1.77	0.61	1.00	3.88
Grade 8	1.79	0.62	1.00	3.88
Grade 9	1.83	0.64	1.00	3.81
Peer acceptance	4.59	2.64	0.00	18.00
Delinquency	1.12	0.29	1.00	3.47
Impulsivity	1.90	0.64	1.00	4.00
Friend intoxication frequency	1.23	0.47	1.00	3.00

Notes: *N* = 1,048. Intoxication frequency items were scored on a 1 (*no, it has not happened*) to 3 (*several times*) scale. Depressive symptom items were scored on a 1 (*not at all*) to 4 (*often*) scale. Delinquency items were scored on a 1 (*no, it has not happened*) to 5 (*more than 10 times*) scale. Impulsivity items were scored on a 1 (*does not apply at all*) to 4 (*applies very well*) scale. Min. = minimum; max. = maximum.

Results

Preliminary analyses

Descriptive statistics are presented in Table 1. Intoxication frequency and depressive symptoms were skewed, the former more than the latter. Scores were log-transformed to correct for skew. Interclass correlations ($p < .05$) described associations between depressive symptoms, intoxication frequency, and peer acceptance within and across grades. Intoxication frequency and depressive symptoms were correlated, concurrently and over time ($r = .12-.19$, $p < .05$). Intoxication frequency ($r = .47-.59$, $p < .01$) and depressive symptoms ($r = .54-.59$, $p < .01$) were stable from one time to the next. Initial acceptance was related to concurrent and subsequent intoxication frequency ($r = .10-.22$, $p < .05$) and to initial depressive symptoms ($r = -.07$, $p < .05$), but not to subsequent depressive symptoms ($r = -.02$, $p = .45$).

Univariate, multiple-group, latent-trajectory growth models for depressive symptoms and intoxication frequency

Separate univariate multiple-group models (low accepted: $n = 234$; average accepted: $n = 589$; high accepted: $n = 225$) were fit to the data for intoxication frequency, $\chi^2(9) = 13.50$, $p > .05$, comparative fit index (CFI) = .99, root mean square error of approximation (RMSEA) = .04, and depressive symptoms, $\chi^2(9) = 25.04$, $p < .05$, CFI = .98, RMSEA = .07. Table 2 describes the means and variances of the intercept and slope parameters. There were linear increases in intoxication frequency for each acceptance group; increases in depressive symptoms were statistically significant only for the average-accepted group. There was significant variance in the slope of intoxication frequency for each acceptance

TABLE 2. Growth statistics for univariate multiple-group models

Model/variable	Group	Intercept		Linear slope	
		<i>M</i> (<i>SE</i>)	Variance (<i>SE</i>)	<i>M</i> (<i>SE</i>)	Variance (<i>SE</i>)
Intoxication frequency	Low accepted	.046** (.009)	.017** (.005)	.078** (.009)	.013** (.003)
	Average accepted	.066** (.007)	.018** (.004)	.099** (.006)	.010** (.002)
	High accepted	.096** (.013)	.031** (.007)	.154** (.009)	.014** (.002)
Depressive symptoms	Low accepted	.232** (.010)	.016** (.002)	.003 (.005)	.002 (.001)
	Average accepted	.217** (.006)	.013** (.002)	.010** (.003)	.002* (.001)
	High accepted	.229** (.009)	.013** (.003)	.006 (.005)	.003† (.001)

Notes: *N* = 1,048; low accepted: *n* = 234, average accepted: *n* = 589, high accepted: *n* = 225.

p* < .05; *p* < .01; †*p* = .06.

group and in the slope of depressive symptoms for the average-accepted group.

Multiple-group, multivariate, latent-trajectory growth model describing change in intoxication frequency as a function of initial depressive symptoms

The multiple-group multivariate growth model with no constraints fit the data, $\chi^2(57) = 93.18$, $p < .05$; CFI = .98, RMSEA = .04. The intercept-to-slope paths were separately constrained to equality across acceptance groups. Compared with the unconstrained model, model fit significantly worsened when the path from the intercept of depressive symptoms to the slope of intoxication frequency was constrained to equality across the high-accepted and low-accepted groups, $\Delta\chi^2(1) = 4.85$, $p < .05$. The strength of association was stronger for low-accepted youth than high-accepted youth. The average-accepted group did not significantly differ from either the low-accepted or the high-accepted group. (Similar results emerged when low- and high-accepted youth were grouped according to ± 1 SD splits—low accepted [$n = 106$]: $\beta = .33$, $p < .05$; high accepted [$n = 140$]: $\beta = -.22$, $p > .05$.) There were no intercept-to-intercept or slope-to-slope path differences between groups. There were mean differences in the slope of intoxication frequency across acceptance groups, $\Delta\chi^2(1) = 4.54$, $p < .05$. The slope of increase in intoxication frequency for the high-accepted group was significantly higher than that of the low-accepted group. Last, there were no differences between acceptance groups in the variances of the intercepts, the variance of the slopes, the covariances between the intercept and slope, or the residual error variances.

Figure 1 describes results for the final model. There was a positive association between the intercept of depressive symptoms and the slope of intoxication frequency for low-accepted youth but not average- and high-accepted youth. There was a positive association between the intercept of depressive symptoms and the intercept of intoxication frequency and a negative association between the intercept of depressive symptoms and the slope of depressive symptoms. Delinquency was positively associated with the intercept of depressive symptoms and the intercept of intoxication fre-

quency. Impulsivity was positively associated with the intercept of intoxication frequency. Friend intoxication frequency was positively associated with the intercept of intoxication frequency, especially for the high-accepted group.

Figure 2 presents the results of simple slope analyses that describe the association between the intercept of depressive symptoms and the slope of intoxication frequency among low-accepted youth. The higher the initial level of depressive symptoms, the sharper the rate of increase in intoxication frequency ($p < .05$). From the seventh to ninth grades, there was an estimated 19% change in intoxication frequency at low levels of depressive symptoms ($B = .11$, $p = .12$), a 26% change in intoxication frequency at medium levels of depressive symptoms ($B = .16$, $p = .06$), and a 32% change in intoxication frequency at high levels of depressive symptoms ($B = .21$, $p = .04$).

Discussion

Depressive symptoms anticipated escalating frequencies of alcohol intoxication for low-accepted but not average- or high-accepted adolescents. In other words, across the middle school years, when most youth have their first experiences with alcoholic beverages, poor peer relations exacerbated the tendency of depressed youth to drink to excess.

The findings suggest that it may be premature to discount affect-regulation drinking models as inapplicable to adolescents. Prior inconsistent findings may be the product of contextual constraints on adolescent drinking. It is not that high-accepted youth shun alcohol; our findings are consistent with others who report that drinking to intoxication increased more for high-accepted than low-accepted youth (Kiuru et al., 2010). Instead, the crucial difference is that drinking is not tied to depressive affect among high-accepted youth the way it is among low-accepted youth. We suspect that high-accepted youth, regardless of their level of depressive symptoms, enjoy social gatherings and use alcohol as a means of promoting positive affect (Cooper et al., 1995). In contrast, parties may drive home feelings of loneliness and isolation for low-accepted youth, who respond with self-medicated drinking because they lack interpersonal resources to cope with rejection and depressive affect. Some low-

FIGURE 1. Multiple-group, multivariate, latent-trajectory growth model of depressive symptoms and alcohol intoxication frequency. *Note:* If there were significant group differences for a path, standardized beta weights for low-accepted (0.75 SD below the mean) adolescents ($n = 234$) are on the left, average-accepted (between 0.75 SD below the mean and 0.75 SD above the mean) adolescents ($n = 589$) are in the middle, and high-accepted (0.75 SD above the mean) adolescents ($n = 225$) are on the right. Beta weights were averaged for paths without group differences. * $p < .05$; ** $p < .01$.

accepted youth, excluded from parties, may resort to drinking in nonsocial contexts. In a bid for support, low-accepted youth may turn to low-accepted, antisocial affiliates, some of whom are apt to have substance misuse problems and model maladaptive patterns of drinking (Prinstein et al., 2009).

Peer relations assume exceptional importance during early adolescence. Increasingly, more time is spent in the company of age-mates, and less time is spent in the company of family members (Larson et al., 1996). Grappling with the demands of autonomy and individuation, adolescents turn to peers for support and guidance, particularly when distressed (Buhrmester, 1996). Youth with peer troubles lack this important coping resource, raising risks on at least two fronts. First, poor peer relations are a source of distress. Second, the absence of supportive peers may deprive youth of an important coping mechanism. Having distanced themselves from their parents, low-accepted youth with few interpersonal

resources may seek solace in alcohol. Studies with adults illustrate the downward spiral: An absence of social contacts creates a paucity of social support, which leads to elevated levels of depression that, in turn, give rise to increasing alcohol consumption (Peirce et al., 2000).

Other explanatory mechanisms were considered. Depressive affect may predict alcohol misuse because of the variance each shares with other potential causal agents. Our analyses included controls for delinquency and impulsivity; neither was responsible for the prospective association between depressive symptoms and increases in intoxication frequency among low-accepted youth. Nor was it the case that the association between initial depressive symptoms and the rate of increase in intoxication frequency was stronger for low-accepted youth than for high-accepted youth because the former had lower levels of problem drinking at age 13 than the latter and then caught up by age 15. High- and low-

FIGURE 2. Estimated change in alcohol intoxication frequency from seventh to ninth grades for low-accepted (0.75 SD below the mean) youth ($n = 234$) at high, medium, and low levels of seventh-grade depressive symptoms.

accepted youth had similar levels of intoxication frequency and depressive symptoms at the outset, and high-accepted youth outpaced low-accepted youth in the rate with which alcohol misuse increased. Nevertheless, absent data on motives for drinking, we can only note that our results, although consistent with negative affect regulation and medicated drinking models, do not rule out alternative explanations.

Temperament remains an important consideration, notwithstanding analyses discounting the contribution of impulsivity. Low effortful control, high reactivity, poor adaptability, and social inhibition have been implicated in later interpersonal difficulties and elevated risk for substance misuse and depression (Eisenberg et al., 2009). Although our model assumes that low-accepted youth drink to cope with negative emotions, we cannot rule out the possibility that drinking is instead (or additionally) motivated by the prospect of enhanced positive affect and improved social experiences (Cooper et al., 1995).

Our investigation is not without limitations. Depressive symptoms and intoxication frequency were both assayed through self-reports. The intoxication frequency scale is a valid measure of alcohol misuse and a strong predictor of alcohol use disorders (Andersson & Magnusson, 1988), but it has not been validated outside of Sweden. Replication with

a standardized assessment of alcohol consumption would be desirable. Despite the limited validity of parental perceptions of internalizing problems (Verhulst & van der Ende, 1992), the lack of independent reports is a significant drawback, and we cannot rule out the possibility of reporter bias such that depressed youth overreported drinking. This study concerned adolescents living in a small, stable community in central Sweden. It remains to be seen whether the findings will generalize to youth in large, diverse cities with mobile populations. Peer troubles were operationalized in terms of low acceptance. A stronger test of the model would involve peer rejection, which is a measure of how much the child is disliked by peers. One year is a suboptimal assessment interval, particularly given that some of the items measuring depressive symptoms and intoxication frequency covered briefer periods. The legal drinking age is 18 in Sweden. Developmental trends may differ in cultures where alcohol consumption officially begins earlier or later.

Last, our intoxication frequency variable was heavily skewed and zero inflated. Log-transformations addressed the former but not the latter. Ideally, we would have confirmed our results with analyses designed for dichotomous data (e.g., logistic estimation) or a Poisson distribution. Unfortunately, we lacked a sufficient number of time points for a

logit model, and we had too few cases of individuals who were drinkers at the earliest time point for multiple-group Poisson models. Absent these analyses, it should be noted that our model may not adequately capture the distinction between nondrinkers who start to drink and drinkers who increase their drinking. Correlations between the trajectory of change in intoxication frequency and the trajectory of change in depression were identified and uniquely apportioned, so that overlapping slopes did not inflate estimates of influence. Unique slope-to-slope correlations did not reach conventional levels of statistical significance, suggesting that the two are unrelated at the population level. This finding should be interpreted with caution: Largely independent growth trajectories may mask the presence of multiple moderators (e.g., acceptance by sex) that we lacked the power to test.

Adolescent alcohol consumption is not just a matter of normative experimentation. Early adolescent drinking forecasts adult employment problems and criminality (Ellickson et al., 2003), with later alcohol-related problems especially pronounced for those who drink to cope (Kuntsche et al., 2005). Findings from the present study suggest that poor peer relations and depressive affect are vulnerabilities that set the stage for escalating alcohol misuse. Although the size of the effect was relatively small, the potential consequences of medicated drinking are not. Alcohol consumption increases health-risk behaviors in adolescents who are already more prone than adults to take risks (Steinberg, 2004).

Some might cast our findings in a positive light, as evidence that good peer relations mitigate the link between depressive affect and subsequent alcohol misuse. Others will emphasize the pitfalls of interpersonal problems. Both interpretations point toward the palliative potential of peers. Depressive symptoms abate when friendless youth make friends (Bukowski et al., 2010), and rates of problem drinking and depression decelerate for youth with friends who consume in moderation and are otherwise well adjusted (Kiuru et al., 2012; Laursen et al., 2012). Practitioners presented with depressed youth who misuse alcohol may well consider pairing the treatment of affective and substance use disorders with an interpersonal intervention.

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