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Direct and Indirect Effects of Parental Influence Upon Adolescent Alcohol Use: A Structural Equation Modeling Analysis

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A model incorporating the direct and indirect effects of parental monitoring on adolescent alcohol use was evaluated by applying structural equation modeling (SEM) techniques to data on 4,765 tenth-graders in the 2001 Monitoring the Future Study. Analyses indicated good fit of hypothesized measurement and structural models. Analyses supported both direct and indirect effects of parental monitoring on adolescent alcohol use. Peer influence, perceived alcohol norms, and conventional bonds mediated the relationship between parental monitoring and adolescent alcohol use. Results suggest parental involvement and proactive parenting skills as critical components of prevention and intervention programs that target adolescent alcohol use.

KEYWORDS adolescent, alcohol use, parental influence, structural equation modeling

INTRODUCTION

Experimentation with alcohol is dramatically increased during adolescence. Available research indicates that alcohol use among adolescents has become a normative behavior, with over 70% percent of tenth-graders and 89% of

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twelfth-graders in the United States reporting some level of drinking (Johnston, O'Malley, & Bachman, 2002). Although experimental drinking is viewed as a normal behavior among adolescents, early or excessive use of alcohol has a number of negative consequences such as drunk-driving, risky sexual behaviors, suicide, health problems, and educational problems (Nash, McQueen, & Bray, 2005).

As these negative consequences have been found among adolescents, preventive efforts have increased and considerable research has been directed toward identifying factors that influence adolescent alcohol use. Of these factors, parental and peer influences have received particular attention as the most consistent correlates of adolescent drinking. On one hand, it has been argued that, in spite of substantive changes during adolescence on dimensions of autonomy and interpersonal relationships, parents continue to provide a secure foundation for adolescent adaptation and an important control mechanism with regard to adolescent behaviors and attitudes. For these reasons, parental involvement has been a major emphasis in prevention programs in both public health and education (Bogenschneider & Stone, 1998; Johnson & Johnson, 2001).

In contrast, other studies have indicated a stronger impact of peer than parental influence on adolescent drinking (Curran, Stice, & Chassin, 1997; Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001). Such research findings have contributed to the development of school-based prevention programs emphasizing adolescents' resistance skills against peer pressure to drink (Epstein, Griffin, & Botvin, 2000; Maggs & Schulenberg, 1998). Inconsistent evidence regarding the effectiveness of school-based prevention programs reinforces the need to reassess the relative contributions of parental and peer influence. Specifically, it has been argued that peer influence has been overestimated and parental influence has been underestimated in both research and prevention fields (Cleveland et al., 2005; Johnson & Johnson, 2001; Sheeber, Biglan, Metzler, & Taylor, 2002). One important reason for the possible underestimation of parental influence is that the traditional application of multivariate analytic techniques (such as multiple regression) to address the relative contributions of parental and peer influence will emphasize the *direct effects* of more proximal variables (peer influence) and will underestimate the possible *indirect effects* of more distal variables (parental influence) (Curran et al., 1997; Simons-Morton et al., 2001). Although the direct effects of parental influence can be less powerful than those of peer influence on alcohol use, some existing research has found that parental influence may nevertheless be indirectly related to adolescent alcohol use through mediating variables.

Parental monitoring, as a dimension of parental influence, has been extensively examined as a control mechanism with regard to adolescent alcohol use and problem behaviors. Although previous studies have examined the role of parental monitoring, much work remains to clarify the direct and indirect effects of parental monitoring on alcohol use. Specifically, much

of existing research has focused upon parental monitoring as a mediating variable itself rather than examining other variables that may mediate the relationship between parental monitoring and alcohol use. For example, studies have examined parental monitoring as a mediator of the relationship between parental alcoholism and substance use, between contextual variables and substance use, between parental support and alcohol use, and between age/sex and problem behaviors (Barnes et al., 2000; Dishion & McMahon, 1998; Richards et al., 2004).

On the other hand, when studies have addressed variables which may mediate the relationship between parental monitoring and alcohol use, these studies are often limited in considering the mediating role of only a single variable. For example, extant studies have examined indirect effects of parental monitoring through a single factor such as peer influence, cognitive factors, or psychological factors (Cleveland et al., 2005; Oxford, Harachi, Catalano, & Abbot, 2000; Watkins et al., 2006). Such studies do not provide a theoretically grounded explanation of more complex mediating models involving parental monitoring effects upon adolescent alcohol use via multiple pathways (Chassin & Handley, 2006; Nash et al., 2003).

Thus, the primary aim of this study is to investigate both direct and indirect effects of parental monitoring on adolescent alcohol use by developing a multivariate model that incorporates the interrelationships of intrapersonal, interpersonal, and environmental factors.

TOWARD A MULTIVARIATE CONCEPTUAL MODEL OF PARENTAL AND PEER INFLUENCE

Our multivariate model of parental and peer influences on adolescent drinking integrates elements from three dominant theoretical perspectives—Social Control Theory (SCT; Elliott et al., 1989), Family Interaction Theory (FIT; Brook, Brook, Gordon, Whiteman, & Cohen, 1990), and Problem Behavior Theory (PBT; Jessor, Donovan, & Costa, 1991). Together, these three theories explain adolescent alcohol use in terms of parent-level variables and their linkages with intrapersonal characteristics, cognitive and attitudinal processes, peer groups, and ecological factors. (See Figure 1.)

Our conceptual model, presented in Figure 1, hypothesizes that Parental Monitoring is related to adolescent alcohol use via both direct and indirect paths. Thus, in this model, Parental Monitoring, as well as both Parental Education and Alcohol and Drug Availability, are viewed as exogenous variables, while Conventional Bonds, Perceived Alcohol Norms, and Peer Influence are all posited as mediating variables.

The primary independent variable in this study is Parental Monitoring, defined as parents' awareness of their child's whereabouts, activities, and friends, and the degree to which the parents set and enforce clear behavioral

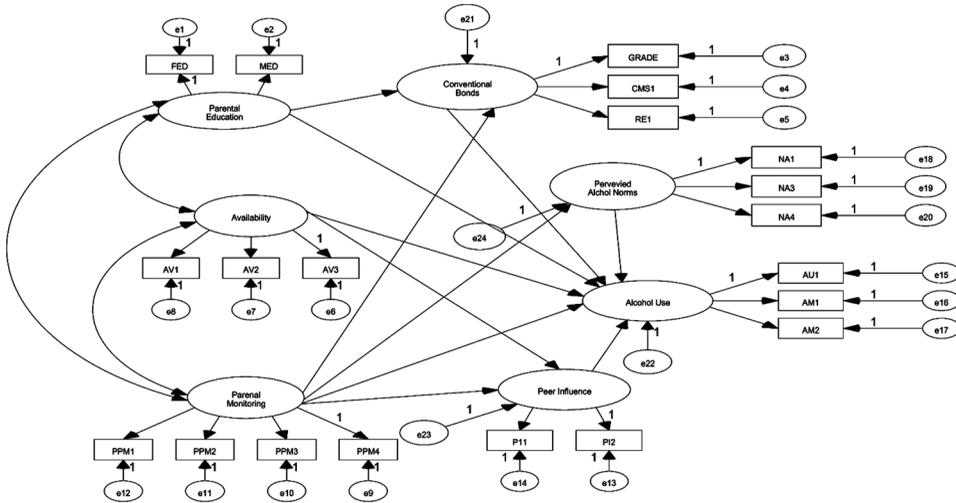


FIGURE 1 Hypothesized structural model.

Note. **FED** = father education level, **MED** = mother education level, **AV1** = availability to alcohol, **AV2** = availability to marijuana, **AV3** = availability to cigarette, **PPM1** = my parents know where I am after school, **PPM2** = when I go out at night, my parents know whom I am with, **PPM3** = when I go out at night, my parents know where I am, **PPM4** = when I go out on weekend nights, I have to be home by a set time, **GRADE** = average grade point, **CMS1** = participation in community affairs or voluntary works, **RE1** = attendance in religious services, **NA1** = disapproval of people taking one or two drinks every day, **NA3** = risk harmfulness of people who have one or two drinks every day, **NA4** = risk harmfulness of people who have five or more drinks once or twice each weekend, **PI1** = the number of friends who drink, **PI2** = the number of friends who get drunk at least once a week, **AU1** = frequency of drinking during the past 12 months, **AM1** = frequency of five or more drinks in a row over the past two weeks, **AM2** = frequency of drunkenness of during the past 12 months.

standards for the child, and has been extensively examined empirically as a measure of the influence of parenting practice and family socialization on adolescent substance use (Jacobson & Crockett, 2000; Oxford et al., 2000). Key to the concept of Parental Monitoring is the degree of involvement between parents and the child. Closer parent-child relationships involving clear communication and close emotional attachment are viewed as making it easier for adolescents to disclose information regarding friends and activities, thus increasing the parents' awareness of their child's activities (Dishion & McMahon, 1998; Stattin & Kerr, 2000). Accordingly, close Parental Monitoring and a reciprocal parent-adolescent relationship are posited as protective factors against adolescent alcohol use.

Parental Education and Alcohol/Drug Availability are important environmental constructs in our model, drawn from SCT, FIT, and PBT theories, and are posited to influence both parental practice and adolescent drinking. Since Parental Education level tends to determine parental jobs and socioeconomic status, it is considered as a proxy variable of family

environment. Alcohol and Drug Availability refers to a social and economic ability to access alcohol and other drugs that goes beyond the formal regulatory control. Availability is a part of the physical environment, but this dimension also reflects social norms and values about adolescent substance use in the community (Single, 1994; Wagenaar et al., 1996). That is, any community where alcohol is readily available to adolescents might also have permissive norms about underage drinking, which would in turn foster social conditions conducive to adolescent drinking in the community.

Peer Influence is posited to function as a mediator between Parental Monitoring and Alcohol Use, and refers to direct peer pressure such as actual offers of drinking and affiliation with alcohol-using peers (Oostveen, Knibbe, & De Vries, 1996). Specifically, Peer Influence occurs when adolescents associate with peers who drink, since the groups provide role models, establish drinking as normative, and increase the availability of alcohol. A related mediating construct involves the adolescent's Perceived Alcohol Norms, defined in terms of normative beliefs and attitudes of positive or negative consequences of drinking behaviors about drinking which precede actual drinking intentions and behaviors (Gaffney et al., 1998; Oostveen et al., 1996). Importantly, adolescents with negative attitudes and beliefs regarding alcohol use begin drinking at older ages and are less likely to yield to peer pressure. Family socialization experiences have been identified as one influence upon adolescents' Perceived Alcohol Norms which, in turn, influence adolescent drinking behaviors (Brody et al., 1999; Hawkins et al., 1997). A third mediating construct is Conventional Bonds, an intrapersonal construct representing the adolescent's commitment to and participation in religion, school, and community activities. Reflecting the broader construct of Conventionality (Donovan et al., 1991), identified as a consistent predictor of substance use in adolescence (Gorman & Derzon, 2002; Schulenberg et al., 1996), Conventional Bonds appear to serve as a possible mediator between the parental domain and adolescent substance use. This construct is measured by positive relations with adults (parents and teachers), educational commitment, religious involvement, and prosocial activities (volunteer activities) (Brook, Kessler, & Cohen, 1999; Erickson et al., 2000; Jessor et al., 1995).

METHOD

Data

This study involves an analysis of tenth-grade data from the 2001 Monitoring the Future (MTF) Study, an annual large-scale, nationally representative study which has included twelfth-graders since 1975 and eighth- and tenth-graders since 1991. The 2001 tenth-grade sample included approximately 130 high schools and approximately 16,000 students. The present analyses use data from MTF questionnaire Forms 3 & 4, which involve a sample of 4,765 tenth-graders.

Measures of Key Model Dimensions

Hypothesized latent variables included three exogenous variables (Parental Monitoring, Parental Education, and Alcohol/Drug Availability); three endogenous mediating variables (Peer Influence, Perceived Alcohol Norms, Conventional Bonds); and an endogenous dependent variable (Alcohol Use). Each latent variable was measured using multiple observed variables, selected on the basis of the previous literature review as well as upon the results of exploratory factor analyses (EFA). Measurement of key dimensions is described below:

PARENTAL MONITORING

Parental Monitoring was measured with four indicators: "My parents know where I am after school;" "When I go out at night, my parents know whom I am with;" "When I go out at night, my parents know where I am;" "When I go out weekend nights I have to be home by a set time." Responses involved a 5-point (1–5) scale, with higher scores indicating higher levels of Parental Monitoring (Cronbach's $\alpha = .76$). This measure is similar to those employed by Fletcher et al. (1995) and Beck et al. (1999).

PARENTAL EDUCATION

Parental Education was measured with two indicators of the level of schooling completed by adolescents' father and mother. Responses involved a 6-point scale, with higher scores indicating higher levels of parental education (Cronbach's $\alpha = .72$).

ALCOHOL/DRUG AVAILABILITY

Alcohol/Drug Availability was measured with three indicators of access to drugs: "How difficult do you think it would be for you to get the following types of drugs, if you wanted some?": (1) alcohol, (2) marijuana, and (3) cigarettes. Responses involved a 5-point (1–5) scale, with higher scores indicating greater availability (Cronbach's $\alpha = .86$). This measure is similar to that used by Brook and colleagues (2001) and Jones-Webb and colleagues (1997).

PEER INFLUENCE

Peer Influence was measured by two indicators of peer alcohol use: "How many of your friends would you estimate drink alcoholic beverages?" and "How many of your friends would you estimate get drunk at least once a week?" Responses involved a 5-point (1 = none; 5 = all) scale, with higher scores indicating larger number of drinking friends (Cronbach's $\alpha = .84$). This measure is similar to those used by Simons-Morton and colleagues (2001).

PERCEIVED ALCOHOL NORMS

Perceived Alcohol Norms were measured with three indicators of the adolescent's disapproval of and perception of the harmfulness of drinking: "Do you disapprove of people taking one or two drinks every day?"; "How much do you think people risk harming themselves (physically or in other ways), if they take one or two drinks every day?"; and "How much do you think people risk harming themselves (physically or in other ways), if they have five or more drinks once or twice each weekend?" Higher scores indicated negative attitudes (Cronbach's $\alpha = .77$). This measure is similar to that used by Hawkins and colleagues (1997).

CONVENTIONAL BONDS

Conventional Bonds were measured with three indicators of commitment to and involvement in conventional institutions: "How often do you attend religious services?"; "How often do you participate in community affairs or volunteer works? (1 = never, 2 = few/year, 3 = 1-2/month, 4 = 1/week, and 5 = daily)"; "Which one of the following best describes your average grade in this school year? (1 = D to 9 = A⁺)". Higher indicated stronger Conventional Bonds (Cronbach's $\alpha = .68$). This measure is similar to that used by Erickson and colleagues (2000).

ALCOHOL USE

Alcohol Use was measured with three indicators: "On how many occasions have you had alcohol to drink during the past 12 months?"; "How many times have you had five or more drinks in a row over the past two weeks?"; and "On how many occasions have you been drunk or very high from drinking alcoholic beverages during the past 12 months?" Higher scores indicated higher levels of alcohol use (Cronbach's $\alpha = .87$).

Overview of the Data Analysis Plan

This study employed structural equation modeling (SEM) techniques using AMOS 4.0 (Arbuckle, 1999) to evaluate the fit of both the measurement and structural components of the hypothesized model (Figure 1). Measurement models were assessed using confirmatory factor analysis (CFA) of exogenous and endogenous variables (Kline, 1998). In order to scale latent variables, the factor loading of one observed variable per latent variable was fixed to equal 1.0. For structural equations, the current study examined regression coefficients (β), the proportion of explained variance (R^2), and the proportion of unexplained variance ($1 - R^2$) for each endogenous variable. In all of our SEM analyses, several measures were used to evaluate the fit of

models to the observed correlation matrices (Hu & Bentler, 1995). Given the sensitivity of the χ^2 statistic in large samples, we used fit indices less sensitive to sample size: the Jöreskog-Sörbom Goodness-of-Fit Index (GFI), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Squared Error of Approximation (RMSEA).

RESULTS

Sample Characteristics

The 4,765 adolescents in the tenth-grade MTF sample included slightly more females (51.8%) than males (48.2%). The ethnic composition of the sample is consistent with national figures (non-Hispanic white: 64.3%; African American: 11.4%). Approximately one-half (57.6%) of the sample was 16 years old; 22.2% lived in rural areas and 77.8% lived in cities. The highest level of parental education achieved (for fathers and mothers, respectively) was high school (44.6% and 39.9%, respectively) and college (25.8% and 27.4%).

Preliminary Evaluation of Measurement Models

The first step of the analysis was to evaluate the fit of hypothesized measurement models using Confirmatory Factor Analysis (CFA) techniques. The CFA of the Parental Monitoring latent variable indicated a good fit to the data ($\chi^2(2) = 48.73$, $p < .000$, GFI = .99, CFI = .99, RMSEA = .078). Because other exogenous and endogenous latent variables included only two or three items in each measurement model and, thus, no degrees of freedom, chi-square and other fit statistics for the individual measurement models (Alcohol Use, Parental Education, Alcohol/Drug Availability, Perceived Alcohol Norms, and Conventional Bonds) were not assessed. Instead, overall tests of the fit of measurement models for exogenous variables and endogenous variables were assessed jointly. Results of these analyses show adequate fit of measurement models for both exogenous variables [GFI = .99, CFI = .99, TLI = .98, RMSEA = .047, $\chi^2(24) = 223.99$] and endogenous variables [GFI = .97, CFI = .96, TLI = .94, RMSEA = .069, $\chi^2(38) = 734.48$].

Table 1 contains standardized factor loadings for each latent variable. Most of the factor loadings of each observed variable to underlying latent variables were statistically significant ($p < .05$) and substantive with loadings larger than .45, with factor loadings in the anticipated direction. Thus, the posited measurement model appears reasonable.

Evaluation of the Structural Model

The hypothesized model (Figure 1) yielded a good fit to the data (GFI = .95, CFI = .94, TLI = .93, RMSEA = .054, $\chi^2(175) = 1926.12$, $p < .000$). For

TABLE 1 Standardized Factor Loadings for Total Sample

Variables	Standardized factor coefficients
Parental Monitoring	
My parents know where I am after school	.69
When I go out at night, my parents know who I am with	.87
When I go out at night, my parents know where I am	.87
When I go out on weekend nights, I have to be home by a set time	.36
Parental Education	
Father education level	.79
Mother education level	.70
Alcohol and Drug Availability	
Availability to alcohol	.86
Availability to marijuana	.72
Availability to cigarettes	.92
Peer Influence	
The number of friends who drink	.89
The number of friends who get drunk at least once a week	.81
Perceived Alcohol Norms	
Disapproval of people taking one or two drinks every day	.68
Perception about risk harmfulness of people who take one or two drinks every day	.74
Perception about risk harmfulness of people who have five or more drinks once or twice each weekend	.75
Conventional Bonds	
Attendance in religious services	.44
Participation in community affairs or voluntary work	.47
Average grade point	.52
Alcohol Use	
Frequency of drinking during the past 12 months	.91
Frequency of five or more drinks in a row over two weeks	.74
Frequency of drunkenness during the past 12 months	.88

parsimony, a revised full structural model was estimated deleting non-significant paths (from Parental Education to Alcohol Use and from Availability to Alcohol Use). Figure 2 shows the standardized parameter estimates for the trimmed structural model. All paths were statistically significant ($p < .05$) and the squared multiple correlation (R^2) indicates that the structural model explained 54% of the variance in adolescent alcohol use. Since the trimmed model fit the data as well as the original model and the increase in chi-square was not significant, trimmed model results are discussed here [GFI = .95, CFI = .94, TLI = .93, RMSEA = .054, χ^2 (159) = 1941.67, $p < .000$].

Examining the structural components of this model, Parental Monitoring had both direct and indirect effects on alcohol use. The direct effect of Parental Monitoring on alcohol use was significant and negative ($\beta = -0.16$), indicating that adolescents who were monitored by parents were less likely to drink. A significant positive direct effect was identified between Parental

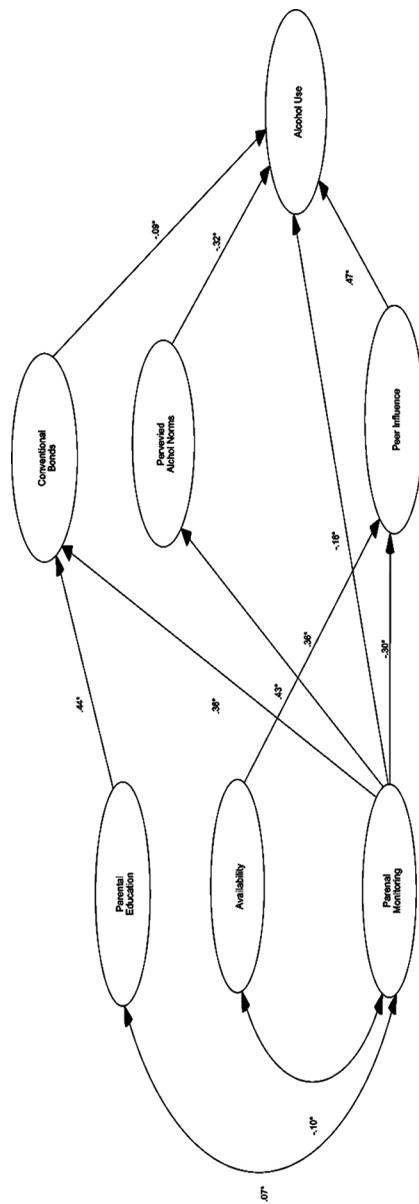


FIGURE 2 Trimmed model eliminating non-significant parameters.

TABLE 2 Decomposition of Exogenous Variable Effects on Alcohol Use

Variables	Total effect	Direct effect	Indirect effect	Indirect effects through:		
				Peer drinking	Perceived alcohol norms	Conventional bonds
Parental Monitoring	-0.46*	-0.16*	-0.30*	-0.14*	-0.14*	-0.03*
Availability	-0.17*	-	-0.17*	-0.17*	-	-
Parental Education	-0.04*	-	-0.04*	-	-	-0.04*

* $p < .05$.

Monitoring and Perceived Alcohol Norms ($\beta = 0.43$), indicating that adolescents who perceived higher levels of Parental Monitoring were more likely to have negative alcohol norms. The relationship between Parental Monitoring and Peer Influence was significant and negative ($\beta = -0.30$), showing that adolescents who reported higher levels of Parental Monitoring were less likely to associate with peers who drink. A significant positive relationship ($\beta = 0.36$) was identified between Parental Monitoring and Conventional Bonds, indicating that adolescents who reported higher levels of Parental Monitoring reported higher levels of Conventional Bonds.

In terms of environmental factors, Parental Education was significantly and positively related to Conventional Bonds ($\beta = 0.44$), indicating that adolescents with more highly educated parents were more likely to be involved in conventional activities. Alcohol/Drug Availability was significantly and positively related to Peer Influence ($\beta = 0.36$), indicating that adolescents having greater accessibility to alcohol and drugs were more likely to associate with peers who drink. Peer Influence was significantly and positively related to alcohol use ($\beta = 0.47$), indicating that adolescents with peers who drank were more likely to drink. Perceived Alcohol Norms were significantly and inversely related to alcohol use ($\beta = -0.32$), showing that adolescents who had negative alcohol norms were less likely to drink.

Decomposition of Direct and Indirect Effects

Table 2 presents the decomposition of effects of exogenous variables on Alcohol Use, including results of significance tests of direct and indirect effects—particularly those involving linkages between the three key model variables (Parental Monitoring, Peer Drinking, and Alcohol Use), and total effects. Importantly, while both direct and indirect effects of Parental Monitoring upon Alcohol Use were significant ($p < .05$), Table 2 indicates that the indirect effects (-0.30) of Parental Monitoring upon Alcohol Use were larger than its direct effect (-0.16). The environmental factor Alcohol/Drug Availability was significantly, indirectly related to Alcohol Use via Peer Influence (indirect effect = -0.17).

DISCUSSION

The primary aim of this study was to further our understanding of parental monitoring influences on adolescent alcohol use by developing and testing a multivariate model incorporating intrapersonal, interpersonal, and environmental factors. Analyses indicate good model fit and also identify theoretically meaningful relationships among the constructs. Our results linking Parental Monitoring to adolescent alcohol use serve to highlight possible protective and risk factors related to adolescent alcohol use in comprehensive ecological domains. Overall, Parental Monitoring appears to serve as a direct deterrent to adolescent alcohol use. In addition, in this study, parental monitoring has substantial indirect effects upon adolescent alcohol use, consistent with other studies of Parental Monitoring and adolescent alcohol use (Cleveland et al., 2005; Jackson et al., 1999; Oxford et al., 2000).

Specifically, study results indicate that the relationship between Parental Monitoring and adolescent alcohol use is mediated by Perceived Alcohol Norms, Peer Influence, and Conventional Bonds. Thus, Parental Monitoring is positively associated with adolescents' disapproval of problem drinking and awareness of the risks of excessive drinking, which are, in turn, negatively related to alcohol use. The findings are consistent with socialization perspectives on the family-peer relationship which emphasize the transmission of parental values and standards to adolescents through monitoring the adolescents' activities to protect them from antisocial peers (Bogenschneider, Wu, Raffaelli, & Tsay, 1998). Our results also show that Parental Monitoring influences Alcohol Use via indirect effects upon Conventional Bonds, suggesting that adolescents who are closely monitored by their parents are more likely to become involved in conventional institutions and prosocial activities in church, community, and school. The finding is consistent with those of other studies investigating the role of conventional social bonds as a mediator between parental influence and adolescent problem behaviors (Brook et al., 2001; Erickson et al., 2000; Mason & Windle, 2001).

Study results also indicate a significant indirect effect of Alcohol/Drug Availability upon Alcohol Use via Peer Influence. Specifically, availability is positively related to the number of peers who drink, which is, in turn, positively related to alcohol use. Alcohol availability represents a part of the community environment and reflects community norms and values about adolescent drinking. Consistent with the tenets of Problem Behavior Theory, Peer Influence may reflect social proximity of alcohol use in the environment. Viewed in an ecological risk-protective framework (Bogenschneider & Stone, 1997), alcohol availability is a contextual risk factor, increasing the probability of adolescent alcohol use and association with peers who drink.

This study has important preventive implications and suggests possible targets for intervention efforts. It may be useful to educate parents regarding

risk factors for adolescent drinking and monitoring techniques associated with reduced alcohol use. Interventions should emphasize not only parental monitoring strategies but also adolescent perceptions of how they are monitored in order to be effective (Chassin & Handley, 2006; Richards et al., 2004). Parental Monitoring should be encouraged early in childhood to mitigate the child's later susceptibility to alcohol use. In particular, this study suggests that certain forms of parental involvement and parenting skill interventions may be effective in reducing risk factors and increasing protective factors, as well as preventing adolescent alcohol use.

Study findings indicate that the alcohol availability should be another target of community-level interventions to prevent adolescent alcohol use. Community intervention programs publicize general norms and make explicit social expectations regarding underage drinking. Community education might be aimed at adults who might provide alcohol to adolescents, making them aware not only of its illegality but also of the alcohol-related health risks to young people. Similarly, Richards and colleagues (2004) suggested that community monitoring can also be an important topic to examine in future intervention efforts.

In addition to important influences of Parental Monitoring and Alcohol Availability, this study demonstrated peer group influences of Perceived Alcohol Norms and Conventional Bonds. These findings suggest that prevention efforts should address multiple ecological domains, including the individual, parents, peer group, school, and community (cf., Dishion & McMahon, 1998).

The current study has limitations. First, given cross-sectional analyses, causal processes and relationships among factors cannot be verified. Longitudinal research is needed to delineate the processes that link parental factors, social environmental factors, interpersonal and intrapersonal mediators, and alcohol use. Second, given a secondary data set, items available for analysis are limited. Thus, the MTF data set does not include measures of potentially important variables such as parental drinking, sibling drinking, and adolescent temperament. Future studies should incorporate such factors into theoretically driven analyses. Third, the large sample size used in the present study represents both strength and weakness. While the sample provides substantial statistical power, we must be cautious of interpreting statistically significant findings that may have debatable substantive importance. Fourth, the present study has only examined the tenth-grade MTF cohort. If there are shifts in the balance of parental and peer influences over the course of adolescence, it might be hypothesized that parental influence would be more salient among younger adolescents and less salient among older adolescents. Further analyses of other MTF cohorts might help to clarify the generalizability of current findings as well as to shed light on possible developmental processes. A final potential limitation of the study lies in the use of self-report measures of alcohol use in this sample of tenth-graders, as such reports might

be influenced by social desirability bias. Unfortunately, no measures of social desirability response set were available in the MTF data to allow for statistical controls. Future studies might appropriately examine the potential influence of social desirability upon student reports of alcohol use.

This study has sought to clarify the relative influence of parental and peer influence and provides substantial support for the role of parental influence—both direct and indirect—with regard to adolescent alcohol use. We have applied sophisticated multivariate modeling techniques to a national sample, and a major strength of the study is the high level of model fit obtained in SEM analyses (explaining approximately 54% of variance in alcohol use, with fit indices consistently yielding fit values well over the commonly accepted .90). While important questions remain, such as whether parental influence remains as salient in older age cohorts as in the younger cohort examined here, the present analyses offer strong support for the importance of both parental and peer influences.

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