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The Influence of Alcohol-specific Communication on Adolescent Alcohol Use and Alcohol-related Consequences

Alison Reimuller, M.A.^a, Andrea Hussong, Ph.D.^a, and Susan T. Ennett, Ph.D.^b

^aThe University of North Carolina at Chapel Hill, Department of Psychology

^bThe University of North Carolina at Chapel Hill, Department of Health Behavior and Health Education

Abstract

Alcohol-specific communication, a direct conversation between an adult and an adolescent regarding alcohol use, contains *messages* about alcohol relayed from the adult to the child. The current study examined the construct of alcohol-specific communication and the effect of messages on adolescent alcohol use and alcohol-related consequences. Parent-adolescent dyads were assessed biannually for 3 years (grades 9-11 at wave 6) to examine these relations in a large longitudinal study of adolescents initially in grades 6 through 8. An exploratory factor analysis identified two factors among alcohol-specific communication items, permissive messages and negative alcohol messages. Results showed previous level of adolescent alcohol use moderated the relation between permissive messages and alcohol use outcomes. Plotting of these interactions showed greater alcohol use and consequences with increasing permissive messages in adolescents with higher versus lower levels of previous alcohol use. Results suggest that parental messages regarding alcohol use may impact adolescent alcohol use beyond the effect of general parenting style and parental alcohol use.

Keywords

alcohol-specific; communication; messages; alcohol use; adolescent

Public health efforts ranging from media campaigns (Office of National Drug Control Policy, n.d.) to family interventions (Bauman et al., 2002; Brody et al., 2004) encourage parents to talk to their adolescents about alcohol. Interventions rarely indicate, however, what parents should say to their adolescents when they do discuss this topic. Moreover, current research provides little guidance for parents in how different alcohol-related messages relate to adolescents' future use of alcohol. The current study proposes to explore the construct of alcohol-specific communication and to test the effects of different types of alcohol-specific messages on adolescent alcohol use and alcohol-related consequences, particularly as a function of whether adolescents have already initiated drinking.

Adolescent alcohol use is common in the United States and alcohol is the primary substance used by youth (Johnston, O'Malley, Bachman, & Schulenberg, 2009). A nationally representative study found that some youth begin drinking before age 13 and the percentage of individuals who report having ever consumed alcohol increases over adolescence and young adulthood (Substance Abuse and Mental Health Services Administration, 2005). For example, 39% of 8th grade students compared to 72% of 12th grade students have reportedly

tried alcohol in their lifetime (Johnston et al., 2009). These numbers are of concern considering the potential effects that alcohol consumption has on adolescents. Alcohol use by adolescents is associated with negative consequences such as decreased academic performance, legal troubles, increased risky sexual behavior, and increased risk for alcohol abuse and dependence (U.S. Department of Health and Human Services, 2007). Moreover, drinking onset prior to age 14 is a marker of risk for greater alcohol- and drug-related problems later in life (King & Chassin, 2007).

Studies vary in the percentage of adolescents whose parents have talked to them about alcohol use. As expected, with increasing age, more adolescents report having discussed substance use with a parent (from 43% in a sample with mean age=13, Miller-Day, 2002 to 93% in sample with mean age=18.5 Miller-Day, 2008). Parents who discuss alcohol use with their adolescents use multiple types of messages in these conversations (Ennett, Bauman, Foshee, Pemberton, & Hicks, 2001; Miller-Day & Dodd, 2004; Miller-Day, 2008).

Alcohol-specific communication is conceptualized as a direct conversation between an adult and an adolescent regarding alcohol use. Within these conversations, *messages* are relayed from the adult, in this case a parent, to the adolescent such as 'it is acceptable to drink alcohol' or 'drinking will result in negative consequences. Alcohol-specific communication is conceptualized to be different than, although likely associated with, general parenting style (Ennett et al., 2001). General parenting style, characterized by such dimensions as responsiveness and demandingness, is a broad concept and refers to the way a parent provides for a child's needs for nurturance and limit setting (Baumrind, 1991). Evidence demonstrates that general parenting styles are associated with adolescent alcohol use (Baumrind, 1991) but fewer studies consider how alcohol-specific communication is associated with adolescent alcohol use. The current study examines the unique effect of parental messages on alcohol use above and beyond general parenting styles.

Simply the occurrence of alcohol-specific communication, irrespective of the message content, predicts better alcohol use outcomes for adolescents. The more frequently conversations regarding alcohol use occur, the more likely adolescents are to use safe drinking practices (Booth-Butterfield & Sidelinger, 1998). On the other hand, parents who less frequently caution their young adolescents about alcohol use have adolescents who are more likely to initiate drinking one year later (Andrews, Hops, Ary, Tildesley & Harris, 1993). These findings suggest that the presence of alcohol-specific communication may have a beneficial effect on adolescent alcohol use. However, methodological limitations undermine confidence in the conclusions we can draw about the benefit of alcohol-specific communication. Of the two studies above, one is cross-sectional, limiting the causal conclusions that can be drawn, and the other relied on only one item to measure the frequency of parental messages about the health consequences of alcohol use.

Preliminary research finds that commonly used messages concern rules regarding alcohol use (e.g., the adolescent cannot use alcohol or the adolescent will be disciplined for use; Ennett et al., 2001), information regarding the negative consequences that result from alcohol use (e.g., resulting health problems associated with alcohol use; Ennett et al., 2001; Andrews et al., 1993), and messages that express permissiveness of alcohol use (e.g., parents allow the adolescent to drink alcohol at home; Jackson, Henriksen, & Dickinson, 1999; Miller-Day, 2008; van der Vorst, Engels, Dekovic, Meeus, & Vermulst, 2007). For example, in a previous study using the same data included in this study, a confirmatory factor analysis showed evidence of four types of messages parents may give about alcohol (Freire, 2008). Two of these are similar to those reported in previous studies; namely messages about health consequences and permissive alcohol messages. The remaining two include alcohol contingency messages (e.g., messages about what the adolescent should do if they do drink)

and alcohol monitoring (e.g., checking for physical evidence of substance use). Similar to permissive messages, alcohol contingency messages concern what teenagers should do when they do drink (e.g., call for a ride), which may condone the drinking behavior itself. In contrast, alcohol monitoring occurs when parents check for physical evidence of alcohol use (e.g., looking around the adolescent's room). These actions differ from alcohol-specific communication in that discussions about alcohol use do not necessarily occur when parents monitor for alcohol use. For this reason, alcohol monitoring may be conceptually distinguished from other alcohol-specific communications and we do not explore it further in the current study. Rather we focus on health consequences, rule-based messages and permissive messages.

Several studies find that these messages about alcohol use have different effects on adolescent alcohol use. Alcohol-specific communication regarding rules (Spijkerman, van den Eijnden, & Huiberts, 2008; van der Vorst, Engels, Meeus, Dekovic, & Van Leeuwe, 2005) and health consequences (Andrews et al., 1993) are associated with lower rates of alcohol use. In contrast, permissive alcohol-specific communication predicts higher levels of use (Jackson et al., 1999) and alcohol misuse (Freire, 2008; Wood, Read, Mitchell, & Brand, 2004). However, supporting studies assess the effect of only one type of message on adolescent alcohol use and have not examined the construct validity of their measure (van der Vorst et al., 2005; Andrews et al., 1993). In contrast, Ennett et al. (2001) found that three domains of alcohol-specific communication including rule-based messages, media messages, and messages related to the consequences of alcohol use had no effect on the initiation of adolescent drinking. The current study contributes to this body of work by assessing different types of messages simultaneously, including permissive messages as well as rule-based and health consequence messages.

Moreover, the current study considers whether the efficacy of such messages differs across adolescents depending on their previous experience with alcohol. Adolescents may internalize parental messages about alcohol differently depending on their experience with alcohol use as such messages are incorporated into an existing opinion or position on alcohol. For example, a parental message that indicates that alcohol is bad for one's health may be competing with the preexisting belief that alcohol does not make you unhealthy in an adolescent who has initiated drinking but who has not yet experienced health consequences. Some evidence suggests that if the adolescent is already using alcohol, parental messages regarding health consequences are associated with a continuation of use (Andrews et al., 1993). In addition, adolescents who have already initiated use and been exposed to rule-based messages have been found to escalate alcohol consumption (Ennett et al., 2001; van der Vorst et al., 2007), whereas adolescents whose parents apply strict rules about alcohol use have been found to be less likely to *initiate* drinking at a one year follow up (van der Vorst, Engels, Meeus, & Dekovic, 2006). Although some evidence suggests that parental messages regarding health consequences or rule-based messages may increase alcohol use in teens who have initiated drinking, no evidence exists regarding permissive messages. Additionally, to our knowledge, no studies have examined whether the adolescent's alcohol use moderates the relation between alcohol-specific messages and alcohol-related consequences. Once an adolescent has already initiated alcohol use, reducing alcohol-related consequences becomes important. Exploration of the effect that alcohol-specific communication has on alcohol-related consequences will elucidate whether parental messages about alcohol reduce the harmful consequences associated with drinking.

The current study explores the construct validity of alcohol-specific communication items, investigates relationships longitudinally, and examines more than one type of message simultaneously. In addition, we investigate the unique effect of alcohol-specific communication above and beyond general parenting style. We first examined the factor

structure of alcohol-specific messages and then tested two hypotheses. Rule-based or health consequence messages were hypothesized to predict no escalation in adolescent alcohol use or alcohol-related consequences whereas permissive messages would result in an escalation of alcohol use and alcohol-related consequences. Second, we expected previous alcohol use to moderate the effect of rule-based and health consequence messages on alcohol use outcomes, such that increases in alcohol use and alcohol-related consequences would be expected for adolescents with previous alcohol use experience. On the other hand, we expected that the effect of permissive messages would not depend on previous experience with alcohol as all adolescents were predicted to increase alcohol use and alcohol-related consequences. We also explored whether race/ethnicity moderated the relation between alcohol-specific communication and alcohol use outcomes. These relations were examined in adolescents ages 11-18, an age range known for initiation of and increases in alcohol use and alcohol-related consequences.

Method

Participants

The Context/Linkages study consists of adolescents and parents in three counties across the state of North Carolina. All schools in these counties with grades 6-12 participated including middle schools, high schools, K-8 schools and alternative schools. At the initial wave of data collection, subjects were enrolled in the 6th, 7th or 8th grade (9th grade marked the beginning of high school) and were assessed twice annually for three years, or for six waves. At each wave, all adolescents in the targeted grades were eligible for the study with the exception of those in classrooms for Exceptional Children and those with inadequate English reading skills to complete the questionnaire. At the first wave of data collection, 5220 adolescents in 13 schools participated. Adolescents were almost evenly distributed among 6th, 7th, and 8th grade with 36%, 33% and 31% enrolled in each grade, respectively.

A simple random sample of 2727 parents who had adolescents in participating schools was identified. Of the 2727 parents chosen, 512 were ruled ineligible to participate because their adolescent did not participate in wave 1 of the study (i.e., 17 adolescents were absent on the day of data collection, 266 parents refused adolescent participation, 31 adolescents refused to participate, and 196 adolescents were not eligible) resulting in 2215 parents contacted for participation. Eligibility criteria for parent participation included having only one child in the school-based study and the ability to complete the interview in English (N=2062). 80.7% of eligible parents participated (N=1663) and 90% of those interviewed were mothers or mother surrogates. Unlike the adolescent sample, new parents were not enrolled after wave 1. This core sample includes families in which both the adolescent and parent participated in the study (N=1663).

88.4% of eligible adolescents within participating schools completed wave 1. Eligible adolescents did not participate due to absence from school on data collection day, parental refusal of adolescent participation, or adolescent refusal. Completion rates in the core sample decreased over the 6 waves; 100% participated at wave 1, 82.8% at wave 2, 85.2% at wave 3, 80.0% at wave 4, 76.1% at wave 5 and 59.6% at wave 6. Attrition also occurred in the parent sample; 82.5% of the initial parent sample participated in wave 3 and 71.8% participated at wave 5.

The core sample consists of a diverse group of adolescents self-identifying as 56% White, 36% African American, 1% Latino and 5% other race/ethnicity. The sample is 48% male and 31% reported living with only one parent. At the initial wave of data collection, the mean age was 13 years. The core sample is representative of the larger sample on all demographic variables and is used in all analyses.

Procedures

Adolescents completed self-report questionnaires that took approximately one hour within classrooms or larger group settings (e.g., cafeteria). Teachers stayed in classrooms to control student behavior but, to maintain confidentiality, did not move around the room. Additionally, students spread themselves around the room and were asked to place questionnaires into envelopes before returning them to study staff. Parents were asked to complete a 25 minute telephone survey annually at waves 1, 3 and 5.

Schools in one of the three counties did not participate in school-based administration in wave 6 but questionnaires were mailed to those adolescents in the core sample. Additionally, students who moved out of participating counties were mailed questionnaires and parents were still interviewed via telephone. A one-way ANOVA demonstrated that adolescents who mailed in their questionnaires drank alcohol with similar frequency as those who completed questionnaires at school ($F(2,301)=0.38, p>.10$), reducing concern of method effects. Therefore, all adolescents were included in analyses.

Measures

Demographics—Adolescents reported their sex, age, and race/ethnicity. Race/ethnicity was recoded as White (the reference group), African American, or ‘other race/ethnicity’ (given low representation). In addition, adolescents were asked who they live with most of the time as an indicator of whether the teen lived in a one- or two- parent home. Level of education completed by both a mother figure and a father figure was assessed through adolescent report and the highest level of education reported across both parents was used as an indicator.

Alcohol-specific Communication—Parents reported use of alcohol-specific communication with their adolescent. 71% of parents reported having ever had a direct conversation with their adolescent regarding alcohol and 76% of those parents had that conversation in the past 3 months. All participating parents indicated on a dichotomous scale whether or not they had ever made 12 specific statements regarding alcohol. These items were predictive of concurrent alcohol misuse in Freire (2008) and were factor analyzed in the current study to explore underlying parental messages.

Adolescent Alcohol Use—Adolescent alcohol use was assessed as the frequency of use in the past 3 months. Adolescents reported the number of days they had 1 or more drinks of alcohol. Six options were given ranging from “0 days” to “20 or more days” and responses were scored as 0-5 with higher scores representing more frequent alcohol use. Three additional questions assessed the number of times in the past 3 months the adolescent (1) had 3 or 4 drinks in a row, (2) had 5 or more drinks in a row, and (3) had gotten drunk or very high from drinking alcoholic beverages. Each of the four items were standardized and averaged to create a composite adolescent alcohol use score with high reliability ($\alpha=0.95$).

Alcohol-related Consequences—Adolescents reported the number of times they experienced six alcohol-related consequences over the past 3 months. Items were adapted from the National Longitudinal Study of Adolescent Health and included being hungover, getting into trouble with parents because of drinking, having problems with someone they are dating because of drinking, doing something they later regretted because they had been drinking, getting into a sexual situation they later regretted because they had been drinking, and getting into a physical fight because they had been drinking (Bearman, Jones & Udry, 1998). Items were dichotomized to reflect whether or not any consequences occurred because frequencies were heavily skewed to the right. These six items were averaged to

create a composite score with higher scores indicating greater alcohol-related consequences with adequate reliability ($\alpha = 0.88$).

General Parenting Style—Adolescents were asked to report on parental responsiveness and demandingness, separately for mother and father, using items from the Authoritative Parenting Index (Jackson, Henriksen, & Foshee, 1998). Three items from each scale were administered and responses were averaged to create a composite responsiveness score and a composite demandingness score. Because 90% of parents who participated were mothers or mother surrogates, adolescent reports of maternal parenting were chosen for analyses. Items were scored on a 0-3 scale with higher scores indicating high levels of responsiveness and demandingness. Reliability estimates for the responsiveness and demandingness scales were adequate ($\alpha = 0.87$ and $\alpha = 0.80$, respectively).

Parental Alcohol Use—Parents reported how frequently they consumed alcohol in the past 3 months using six response options ranging from ‘almost every day’ to ‘less than one day a month’. Responses were scored such that higher scores corresponded to greater frequency of alcohol use. Parents were also asked how many drinks they usually have on days when they drank. Five response options were given with the number of drinks increasing from ‘1 drink’ to ‘5 or more drinks’. Individuals who had never had a drink in their lives skipped out of these questions and it is therefore assumed that they would have responded ‘never drink’ to both questions. A product of frequency and quantity scores was created as an indicator of parental alcohol use.

Results

Data Sampling

To focus on short-term changes in adolescent alcohol use associated with parents' behavior and to retain the advantages of prospective data and a diverse age range, we chose a 2-wave design for analysis. The original study design consisted of six waves of data for each participant. In order to restructure our data as a 2-wave design, we selected two consecutive waves of data for each individual in the core sample such that predictor and control variable data were used for each individual at wave 1, wave 3 or wave 5, and outcome measures were used from the subsequent assessment wave (2, 4 or 6, respectively). Therefore, each individual contributed only two waves of data (wave 1 & 2, wave 3 & 4, or wave 5 & 6). Regardless of the waves selected, the lag time between the waves was 6 months, with the baseline data (wave 1, 3, or 5) from a spring assessment and follow-up data (wave 2, 4, or 6) from a fall assessment. This resulted in a model that predicted adolescent alcohol outcomes 6 months after the baseline assessment, allowing us to examine changes in alcohol use expected to occur shortly after parental messages are delivered. Selection of wave for analysis was guided by the goals of retaining all possible cases and creating a balanced distribution across the three assessment windows. Almost all participants were retained and sampling two waves eliminated concern about dependence among multiple observations over time. This approach allowed analysis of a broader age range than would be captured by analyzing change from wave 1 to wave 2 only.

To select time points for each participant, we first identified participants' eligibility for the three groups (group 1: waves 1 and 2; group 2: waves 3 and 4; group 3: waves 5 and 6; step one). To be eligible for a group, the adolescent must have completed both assessment waves (e.g., waves 3 and 4) and the parent must have completed the first wave (e.g., wave 3). Some participants did not meet the criteria necessary to be in any group ($N=152$) and were dropped from analyses. Individuals that were eligible for only one of the three groups were then assigned to that group (step two). Based on this criterion, 207 families were assigned to

group 1, 38 families to group 2 and 49 families to group 3. The remaining participants were randomly assigned to groups for which they were eligible, but with the constraint that approximately equal sample sizes (~503) would be obtained in each of the three groups. We began this assignment with participants eligible for two groups (step three). We randomly assigned these individuals according to the proportion of the total needed for a given group (e.g., group 1: 503 total needed - 207 already assigned in step 2 = 296 still needed to fill group 1; group 2: 503 total needed - 38 already assigned = 465 still needed to fill group 2). Lastly, we randomly assigned individuals who were eligible for all three groups until the groups were filled (step four). In the final sample, 502 families were assigned to group 1, 503 families to group 2 and 506 families to group 3, yielding an overall sample size of 1511. Table 1 includes key demographic information for the final analysis sample from the baseline assessment.

Exploratory Factor Analysis

An exploratory factor analysis (EFA) was conducted to elucidate the underlying messages that parents convey to their adolescents through a variety of alcohol-specific discussions. A maximum likelihood exploratory factor analysis with communalities set to squared multiple correlations was used to determine the number of factors that should be extracted. Examination of eigenvalues showed a precipitous drop from a one-factor solution to a two-factor solution and another substantial decrease from two factors to three factors. A scree plot indicated extraction of either two or three factors.

A maximum likelihood exploratory factor analysis with an oblique rotation was then used to model factor correlations and to identify the simple structure underlying the relation of the items to the underlying factors. A two-factor solution found that although three items cross-loaded on both factors, the majority of items cleanly loaded onto one of the two factors. The interfactor correlation of the two-factor solution was 0.41. The three-factor solution contained one factor with a single item and two additional items that cross-loaded among the factors. Intercorrelations were 0.33 (factors 1 and 2), 0.49 (factors 1 and 3), and 0.25 (factors 2 and 3). The two-factor solution was considered a better fit than the three-factor solution based on the criteria of simple structure and parsimony (Gorsuch, 1983).

Although the two-factor solution was chosen as the best fit, there remained concern with the three cross-loading items. A two-factor maximum likelihood EFA with oblique rotation was conducted removing these three items. Results showed that removing cross-loading items resulted in a cleaner two-factor solution with an interfactor correlation of 0.38 (Table 2). Analysis of item content reveals a “negative alcohol messages” factor and a “permissive messages” factor. Items that loaded onto the negative alcohol message factor were related to health consequences and parental rules associated with alcohol use whereas items that loaded on the permissive message factor show acceptance of alcohol use. Findings informed scoring of two alcohol-specific communication scales for subsequent analyses. Cronbach's alphas indicated that the negative alcohol message scale had high reliability ($\alpha = 0.95$) and the permissive alcohol messages scale was reasonably reliable ($\alpha = 0.69$).

Rates and Correlates of Messages

Descriptive analyses examined associations among key variables in analyses (Table 3) and differences in alcohol-specific communication and frequency of alcohol use across families as a function of demographic characteristics. Parents reported using a greater number of negative alcohol messages than permissive messages. On average, parents endorsed using 67% of negative alcohol messages compared to 18% of permissive messages. Parents used significantly more permissive messages with girls than with boys ($t(1317)=2.05, p<.05$) and with older adolescents, aged 15-18 years old, than with younger adolescents, aged 11-14

years old ($t(1313)=-2.02, p<.05$). On the other hand, parents in two-parent households used significantly more negative alcohol messages than those in one-parent households ($t(1237)=2.24, p<.05$).

There were also significant differences in the use of negative alcohol messages ($F(2,1297)=13.67, p<.0001$) and permissive messages ($F(2,1297)=43.45, p<.0001$) by parents from different cultural backgrounds. White parents and parents who self-identified as neither White nor African American reported using significantly more permissive messages than African American parents ($p<.05$). Additionally, White parents also acknowledged using negative alcohol messages more than ethnic minority parents with a significant difference between White parents and African American parents ($p<.05$).

Rates and Correlates of Drinking

Adolescents reported drinking, on average, between 0 days and 1-2 days in the past 3 months at both baseline and follow-up ($M=0.42$ and $M=0.46$, respectively). Similarly, adolescents reported, on average, drinking 3-4 drinks (baseline mean=0.18, follow-up mean=0.21), drinking 5 or more drinks (baseline mean=0.12, follow-up mean=0.15), and being drunk (baseline mean=0.17, follow-up mean=0.22) between 0 times and 1-2 times in the past 3 months.

At baseline, adolescents living with one parent reported drinking alcohol significantly more frequently than those living with two parents ($t(1362)=-3.56, p<.001$). However, 6 months later, there was no significant difference in alcohol use frequency across different family structures. Although adolescents ages 15-18 drank significantly more frequently than adolescents ages 11-14 at baseline ($t(1445)=-3.59, p<.001$), no significant differences in alcohol use frequency were found 6 months later. In addition, there were also differences in baseline and follow-up frequency of alcohol use by adolescents of different racial backgrounds ($F(2,1423)=3.13, p<.05$ and $F(2,1393)=4.40, p<.05$, respectively). Post hoc comparisons indicate that although at follow-up, White adolescents drank significantly more than African American youth ($p<.05$), no significant differences were found when comparing racial groups to one another at baseline.

Multiple Imputation

Although missing data were modest (57% of parent-child dyads were not missing any study predictors or outcomes variables and 75% of dyads were missing seven or fewer variables) we addressed missing data using multiple imputation with PROC MI (SAS Institute, 2009). Demographic variables, predictors and outcomes were included in the imputation model at the item level. Twenty imputations were calculated (Bodner, 2008; Graham, Olchowski, & Gilreath, 2007), which were then used for subsequent analyses. Findings across imputed datasets were combined to produce results using PROC MI ANALYZE (SAS Institute, 2009).

Alcohol-Specific Communication and Alcohol Use

A hierarchical linear model was estimated using Proc Mixed (SAS Institute, 2009) to test the effect of parents' alcohol-specific messages on an adolescent's subsequent alcohol use above and beyond the effect of general parenting style (Table 4). We estimated a random intercept only model in which individuals were nested within schools. Although all model predictors were level 1, within school variables (individual level variables), a random intercept was included to account for differences in alcohol use across schools.

Adolescents who used alcohol more frequently at baseline drank significantly more frequently 6 months later than adolescents who drank less frequently at baseline ($\beta = -0.40$,

$p < .001$). Other demographic variables were not significantly associated with frequency of alcohol use at follow-up. Neither negative alcohol messages nor permissive messages predicted future alcohol use. To test for the effect of different levels of alcohol-specific communication across ethnically diverse groups, interaction terms between race/ethnicity and messages were included in the model. Results indicated that there was not a significant interaction of race/ethnicity and parental messages.

To examine whether the adolescent's current level of alcohol use moderated the relation between alcohol-specific communication and alcohol use, interactions between both alcohol-specific communication scales and adolescent alcohol use at baseline were included in the model. Results indicate that there was a significant interaction of permissive messages and alcohol use at baseline on subsequent adolescent alcohol use above and beyond the effect of general parenting style ($\beta = 0.23$, $p < .05$). Plotting the interaction showed that the effect of permissive messages on alcohol use was stronger as the frequency of previous alcohol use increases. Increasing permissive messages resulted in an increase in alcohol use frequency across levels of previous alcohol use but the strength of this relation increased with greater previous alcohol use.

Alcohol-specific Communication and Alcohol Consequences

A similar hierarchical linear model was conducted predicting adolescent alcohol-related consequences (Table 5). Adolescents who reported having more alcohol-related consequences at baseline reported significantly more alcohol-related consequences 6 months later than adolescents who reported fewer consequences at baseline ($\beta = 0.29$, $p < .001$). When negative alcohol messages and permissive messages were added into the model, neither type of alcohol-specific communication was significantly associated with alcohol-related consequences, nor were interactions of race/ethnicity and communication scales significant predictors of alcohol-related consequences.

However, there was a significant interaction of permissive messages and alcohol use at baseline on alcohol-related consequences above and beyond the effect of general parenting style ($\beta = 0.03$, $p < .05$). Plotting this interaction showed that the effect of permissive messages on alcohol-related consequences followed the same pattern as the effect on alcohol use. However, probing of simple slopes showed no region of significance indicating that at no level of previous alcohol use was the effect of permissive messages on alcohol-related consequences significant.

Discussion

The current study provided evidence of the construct validity of alcohol-specific communication scales as identified by an exploratory factor analyses. Study analyses also examined whether alcohol-specific communication has an effect on adolescent alcohol use and alcohol-related consequences using longitudinal data. The detrimental effect of permissive messages was most pronounced among those with greater alcohol use and alcohol-related consequences. These relations were present above and beyond the effects of parental alcohol use and general parenting factors which provides support for the importance of parent-adolescent communication about alcohol use regardless of other parenting behaviors.

Alcohol-Specific Communication

The exploratory factor analysis revealed two factors among the alcohol-specific communication items, namely negative alcohol messages and permissive messages. Parental messages regarding rules and health consequences factored together, indicating that parents

in this sample tended to discourage alcohol use through both types of messages. These findings are different from those found by Ennett et al. (2001) using a different sample in which rule-based messages and consequences were found to be two separate factors. However, a post hoc exploratory factor analysis that excluded permissive items showed that rule-based messages and health consequence messages were separate factors when these items were considered alone. This provides some support for a hierarchical factor structure consisting of two underlying factors, namely permissive messages and negative messages which consist of both health consequence and rule-based messages.

Parents reported using negative alcohol messages more often than permissive messages. Previous studies have presented mixed findings concerning the frequency with which negative alcohol messages and permissive messages are used (Jackson et al., 1999; Miller-Day, 2008). Discrepant findings may be a function of the child's age. Fifth graders reported having more rules about alcohol use than parental permissiveness of alcohol use at home (Jackson et al., 1999). On the other hand, a study of undergraduates found that permissive messages were used by parents more frequently than rules or health consequence messages (Miller-Day, 2008). In our sample of middle and high school students, parents reported using negative alcohol messages more than permissive messages and they used permissive messages more often with older than younger adolescents.

Other individual differences in the use of messages depended upon family structure, child gender, and cultural background. Parents in two-parent households reported using more negative alcohol messages than those in one-parent households, perhaps reflecting more opportunities for the adolescent to receive these messages. In contrast, parents used more permissive messages with girls than with boys, perhaps reflecting more trust in how their daughters than sons will use alcohol safely.

Finally, White parents communicated with their adolescents about alcohol use, regardless of the type of message used, more than other parents whereas African American parents used fewer messages than other parents. These ethnic differences in alcohol-specific communication parallel findings that White parents communicate more with their adolescent than do African American and Latino or Asian parents (Hill & Tyson, 2008 and Shakib et al., 2003, respectively). However, the effect of parental messages on alcohol use and alcohol-related consequences did not differ across race/ethnicity. Together, these findings show that parents use these messages, that these messages reflect a hierarchical structure involving negative and permissive messages, and that there are predictable individual differences in how often these messages are used.

Permissive Messages

As predicted and previously supported (Jackson et al., 1999), permissive messages were associated with more frequent alcohol consumption. However, the effect of permissive messages on alcohol use and alcohol-related consequences was found to depend on the adolescent's experience with alcohol at baseline. Although permissive messages had a detrimental impact on many adolescents, using permissive messages with those adolescents who were already drinking was found to be more harmful than using permissive messages with adolescents who were not already using alcohol.

Although the effect of permissive messages on alcohol-related consequences was in the same direction as on alcohol use, the effect was weaker. This weaker effect could simply be due to the skewed nature of the measure of alcohol-related consequences. Alternatively, along with parental acceptance of alcohol use, permissive messages also indicate conditions under which it is acceptable to drink (e.g., the adolescent can drink at home). This could result in increases in alcohol consumption but may not significantly impact alcohol-related

consequences. For example, an adolescent may increase drinking at home which would impact frequency of alcohol use but not necessarily lead to situations in which alcohol-related consequences may be more likely to occur. Although the effect of permissive messages on alcohol-related consequences was less reliable, it remains important to further explore these findings given the adverse effects alcohol-related consequences have on adolescents.

Our findings suggest that parents should be cautious when using permissive messages with their adolescents. Parents who wish to relay permissive messages to their teenagers should be aware of the amount their adolescents are using alcohol before choosing to do so. However, previous studies have found that parents are not generally aware of their adolescent's alcohol use (Williams, McDermit, Bertrand, & Davis, 2003; Friedman, Glickman, & Morrissey, 1990). This makes the decision to use permissive messages more difficult since parents cannot be sure of the extent of risk involved with using such messages if they are unsure how much their adolescent is drinking.

Negative Alcohol Messages

Although negative alcohol messages predicted less frequent alcohol use in previous studies, the current study found no relationship with adolescent alcohol use. These findings indicate that negative messages about alcohol are not beneficial in reducing adolescent alcohol use and raise questions regarding the types of messages that may be associated with less frequent alcohol use. Results point to the need for identification of additional messages that may be beneficial for youth.

Conclusions

The current study used data from a diverse group of adolescents and parents to assess the effect of alcohol-specific communication on alcohol use and alcohol-related consequences. Findings provide evidence of construct validity of alcohol-specific communication scales. In addition, parental permissive messages predicted increased alcohol use and alcohol-related consequences depending on an adolescent's frequency of alcohol use at baseline with stronger effects at higher levels of previous use. Negative alcohol messages were not found to be beneficial for youth.

Several limitations of the current study should be noted. Whereas several of the relationships examined were found to be significant, effect sizes were small. Nevertheless, the effects represent residualized change in adolescent alcohol use after controlling for general parenting behaviors and parental alcohol use. In addition, the measures may have been affected by social desirability bias. Parents may have responded with more socially desirable answers than they might have if not asked to provide answers by means of telephone interview (Richman, Kiesler, Weisband & Drasgow, 1999; Holbrook, Green & Krosnick, 2003). Parents may have been more likely to endorse negative alcohol messages than permissive messages as permissive messages may be seen as less socially desirable. Moreover, although longitudinal data were used, it is not clear whether parents' alcohol-specific communication was in response to alcohol use or consequences already in place before the baseline measure. Parents may have learned of adolescent alcohol use and communicated with their children in response to teen drinking before our baseline assessment. The type of communication used may have been affected by the parent's knowledge of adolescent alcohol use. Future studies should examine the transactional nature of these processes.

Future research should explore additional types of messages such as parental disappointment in youth when they use alcohol and how to avoid and cope with peer pressure. Researchers

should also explore the effect of simultaneous use of multiple types of messages by the same parent or different parents and the ways in which adolescents internalize these potentially conflicting messages. Studies should explore the effect that mixed messages of parental alcohol use and alcohol-specific communication have on teens as well as the impact that adolescent involvement in parental alcohol use may have on an adolescent's alcohol use. Finally, future studies should assess the frequency with which parental messages are used to continue exploring alcohol-specific communication and parental messages.

Prevention Implications

These results provide preliminary evidence for reconsideration of the way in which media campaigns are framed. More research is needed in order to detail what should and should not be discussed with different groups of adolescents as one type of parental message does not appear to be beneficial for all adolescents. Prevention efforts that involve parents in reducing adolescent alcohol use and alcohol-related consequences should be well informed regarding what messages are most beneficial for different types of adolescents. Exploring level of alcohol use as a moderator may help parents to make a better decision regarding the type of communication to use in order to predict alcohol outcomes for their teens. Findings could also help identify which adolescents are most at risk for escalating substance use and are therefore in need of intervention.

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Table 1
Demographics of the analysis sample at baseline prior to multiple imputation procedures

Analysis Sample Size	1511
Mean Adolescent Age at Time 1 (in years)	14.01 (1.23)
Adolescent Gender (% male)	47.72%
Adolescent Race/Ethnicity	56.12% White 35.94% African American 6.55% 'Other Race' 1.39% Missing
Family Structure (% One-Parent Households)	29.91% 6.68% Missing
Parent Education	5.36% Less than high school 19.06% High school graduate 13.17% Vocational or business school 9.99% Some college 23.43% Graduated from college 9.46% Graduate or professional school after college 19.52% Missing
Mean frequency of drinking	0.42 (1.02)
Mean frequency of drinking 3-4 drinks in a row	0.18 (0.65)
Mean frequency of drinking 5 or more drinks in a row	0.13 (0.59)
Mean frequency of being drunk	0.17 (0.65)
Mean alcohol-related consequences	0.05 (0.17)
Adolescents who reported at least one alcohol-related consequence	9.76%

Table 2
Factor loadings for the two-factor maximum likelihood EFA with oblique rotation of parent-reported alcohol-specific communication items

Variable	Factor 1 Loading	Factor 2 Loading
If he/she ever wants to try a drink, he/she should talk with you first	---	---
If he/she ever wants to try a drink, he/she can have sips of a drink at home in front of you	0.00	0.61
Under some circumstances, it's okay to have sips of a drink, like with parents or for special family occasions	-0.05	0.75
He/she cannot ride with someone who has been drinking	0.86	0.12
He/she cannot drink and drive when he/she is old enough to drive	0.87	0.13
He/she should call home to be picked up if he/she does drink	0.73	0.13
If or when he/she does drink, he/she should drink responsibly	---	---
In your family, drinking is not acceptable	---	---
Drinking in moderation is okay	0.09	0.56
Drinking is not healthy	0.91	-0.21
Drinking can lead to alcoholism	0.95	-0.05
Drinking can cause loss of control	0.93	0.01

Note: Bold items indicate items that were retained on each factor; --- indicates items that were dropped due to cross loadings; Factor 1 ($\lambda = 0.95$); Factor 2 ($\lambda = 0.69$)

Table 3
Bivariate correlation matrix of key predictor and outcome variables in the analysis sample

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age	1.00												
2. Gender	0.07	1.00											
3. Parent Education	-0.07	0.02	1.00										
4. Family Structure	0.02	-0.06	-0.16	1.00									
5. Responsiveness	-0.06	0.09	0.10	-0.08	1.00								
6. Demandingness	-0.07	0.03	0.08	-0.14	0.49	1.00							
7. Parent's Alcohol Use	0.03	-0.03	0.08	0.02	0.00	-0.01	1.00						
8. Adolescent Alcohol Use- Baseline	0.14	0.04	-0.10	0.10	-0.12	-0.18	0.07	1.00					
9. Adolescent Alcohol Use- Follow up	0.08	0.02	-0.04	-0.01	-0.07	-0.10	0.08	0.43	1.00				
10. Adolescent Alcohol Consequences- Baseline	0.10	0.02	-0.05	0.08	-0.12	-0.15	0.06	0.73	0.32	1.00			
11. Adolescent Alcohol Consequences- Follow up	0.03	-0.04	-0.06	-0.01	-0.09	-0.14	0.04	0.30	0.67	0.36	1.00		
12. Negative Alcohol Messages	0.05	0.03	0.13	-0.06	0.03	0.05	-0.04	0.02	0.01	-0.01	0.01	1.00	
13. Permissive Alcohol Messages	0.05	-0.06	0.20	-0.04	0.00	0.01	0.23	0.10	0.11	0.04	0.05	0.33	1.00
Mean (SD)	14.01	0.48	2.69	0.32	2.32	2.27	2.68	0.02	0.02	0.05	0.05	0.67	0.18
Standard Deviation	1.23	---	1.54	---	0.85	0.83	4.33	0.93	0.94	0.17	0.17	0.42	0.30
Range	11-18	0/1	0-5	0/1	0-3	0-3	0-30	-0.3-5.7	-0.3-5.4	0-1	0-1	0-1	0-1

Note: Bold correlations indicate that $p < .05$; No standard deviation is reported for gender and family structure because the data are binary.

Table 4
Hierarchical linear model of multiply imputed data (imputations=20): the effects of alcohol specific communication on adolescent alcohol use

	(SE)	t-value
Sample Size	1511	
Fixed Effects		
Intercept	0.07 (0.07)	1.00
Age	0.04 (0.02)	1.71
Gender	-0.02 (0.05)	-0.33
Parent Education	-0.002 (0.02)	-0.12
Family Structure	-0.09 (0.06)	-1.58
Responsiveness	-0.003 (0.03)	-0.08
Demandingness	-0.02 (0.04)	-0.68
Parental Alcohol Use	0.007 (0.005)	1.30
Adolescent Baseline Alcohol Use	0.40 (0.03) ***	14.61
Black	-0.10 (0.06)	-1.68
Other Race/Ethnicity	-0.06 (0.10)	-0.62
Negative Alcohol Messages	-0.15 (0.08)	-1.80
Permissive Alcohol Messages	0.16 (0.10)	1.56
Negative Messages * Adol Baseline Alcohol Use	0.06 (0.09)	0.63
Permissive Messages * Adol Baseline Alcohol Use	0.23 (0.10) *	2.34
Random Effects		
Intercept	0.02 (0.01)	1.47
Residual	0.69 (0.03) ***	24.73
R ² (compared to intercept only model)	.2113	

Note:

* p < .05

*** p < .001

Table 5
Hierarchical linear model of multiply imputed data (imputations=20): the effects of alcohol specific communication on alcohol-related consequences

	(SE)	t-value
Sample Size	1511	
Fixed Effects		
Intercept	0.08 (0.02) ***	4.89
Age	0.0002 (0.005)	0.03
Gender	-0.02 (0.01)	-1.50
Parent Education	-0.003 (0.004)	-0.67
Family Structure	-0.02 (0.01)	-1.75
Responsiveness	0.0004 (0.008)	-0.05
Demandingness	-0.01 (0.009)	-1.33
Parental Alcohol Use	-0.0002 (0.001)	-0.13
Adolescent Baseline Alcohol Consequences	0.29 (0.05) ***	6.27
Black	-0.01 (0.01)	-0.78
Other Race/Ethnicity	0.02 (0.02)	0.81
Negative Alcohol Messages	-0.01 (0.02)	-0.80
Permissive Alcohol Messages	0.02 (0.02)	0.91
Adolescent Baseline Alcohol Use	0.01 (0.009)	1.15
Negative Messages * Adol Baseline Alcohol Use	-0.001 (0.01)	-0.07
Permissive Messages * Adol Baseline Alcohol Use	0.03 (0.02) *	1.99
Random Effects		
Intercept	0.0004 (0.0004)	0.88
Residual	0.03 (0.002) ***	18.22
R ² (compared to intercept only model)	.1465	

Note:

* p < .05

*** p < .001