

Accounting for the Association of Family Conflict and Heavy Alcohol Use Among Adolescent Girls: The Role of Depressed Mood

GARY C. K. CHAN, M.SC.,^a ADRIAN B. KELLY, PH.D.,^{a,*} AND JOHN W. TOUMBOUROU, PH.D.,^{b,c,d}

^aCentre for Youth Substance Abuse Research, University of Queensland, Royal Women's and Brisbane Hospital, Brisbane, Queensland, Australia

^bSchool of Psychology and Centre for Mental Health and Wellbeing Research, Deakin University, Melbourne, Victoria, Australia

^cCentre for Adolescent Health, Melbourne, Victoria, Australia

^dMurdoch Children's Research Institute, Royal Children's Hospital, Melbourne, Victoria, Australia

ABSTRACT. Objective: Heavy alcohol use increases dramatically at age 14, and there is emerging cross-sectional evidence that when girls experience family conflict at younger ages (11–13 years) the risk of alcohol use and misuse is high. This study evaluated the role of family conflict and subsequent depressed mood in predicting heavy alcohol use among adolescent girls. **Method:** This was a three-wave longitudinal study with annual assessments (modal ages 12, 13, and 14 years). The participants ($N = 886$, 57% female) were from 12 metropolitan schools in Victoria, Australia, and participants completed questionnaires during school class time. The key measures were based on the Communities That Care Youth Survey and included family conflict (Wave 1), depressed mood (Wave 2), and heavy alcohol use (Wave 3). Control variables

included school commitment, number of peers who consumed alcohol, whether parents were living together, and ethnic background. **Results:** With all controls in the model, depressed mood at Wave 2 was predicted by family conflict at Wave 1. The interaction of family conflict with gender was significant, with girls showing a stronger association of family conflict and depressed mood. Depressed mood at Wave 2 predicted heavy alcohol use at Wave 3. **Conclusions:** Girls may be especially vulnerable to family conflict, and subsequent depressed mood increases the risk of heavy alcohol use. The results support the need for gender-sensitive family-oriented prevention programs delivered in late childhood and early adolescence. (*J. Stud. Alcohol Drugs*, 74, 396–405, 2013)

HHEAVY ALCOHOL USE DURING early adolescence (11–12 years) is rare in Western countries. Data indicate that only 2%–6% of early adolescents have engaged in heavy alcohol use (Johnston et al., 2012; White and Smith, 2009). In Western countries, this picture changes considerably from 14 years of age and beyond. In the United States, 14.7% of 16-year-old students report recently consuming five or more alcoholic drinks, and these rates are 21.6% at age 18 years. In Australia, the regularity of alcohol use among adolescents may be higher than in the United States (Beyers et al., 2004), and 20.2% of 14-year-olds who consume alcohol report “at-risk” alcohol use (defined as seven or more drinks for boys and five or more drinks for girls on

any one occasion in the past week; White and Smith, 2009). It is important to understand the pathways that lead to the growth in prevalence of heavy drinking from low rates at age 12 years to alarmingly high rates around the age of 14 years. Heavy alcohol use by adolescents has prognostic significance for several adverse outcomes, including alcohol-related injury, alcohol dependence, academic failure, and multiple drug use (Ellickson et al., 2003; Tucker et al., 2003). This article focuses on the role of family relationship quality and depressed mood in the prediction of heavy alcohol use at age 14 years.

Family relationship quality has an established role in the prediction of alcohol use and misuse during early to middle adolescence. Research on the role of families in alcohol use and other health risk behaviors draws on Social Developmental Theory (emphasizing family risk and protective factors; Catalano et al., 1996), Family Systems Theory (emphasizing family emotional connections; Bowen, 1978; Minuchin, 1974), and Family Coercion Theory (emphasizing conflict and its escalation; Patterson et al., 1989) as being important for children's well-being and social development (Fosco et al., 2012). Consistent with the place of the family in these theoretical models, family relationship quality during adolescence predicts future social and emotional health (Fosco et al., 2012; Johnson et al., 2008), and family conflict

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*Correspondence may be sent to Adrian B. Kelly at the Centre for Youth Substance Abuse Research, University of Queensland, Brisbane, K-Floor, Mental Health Centre, Royal Brisbane and Women's Hospital, Brisbane, Queensland, Australia, 4029, or via email at: a.kelly@uq.edu.au.

is associated with higher emotional distress in emerging adulthood (Andrews et al., 2000; Reinherz et al., 2003).

There is good evidence that family conflict during early adolescence is related to alcohol use. In Australian large-scale cross-sectional research on 11- to 13-year-olds ($n = 6,837$), Kelly et al. (2011b) found that family conflict was associated with alcohol use in girls but not in boys, and these effects were independent of other known correlates of adolescent alcohol use, including parental disapproval of adolescent alcohol use, parental alcohol use, and peer alcohol use. Cross-sectional research in other countries and cultures also shows an association between family conflict and alcohol use (Kristjansson et al., 2009; Marsiglia et al., 2009). Finally, three multiwave longitudinal studies show a consistent positive association between family conflict and adolescent substance use, with some evidence of variation by adolescent gender. In early to middle adolescents, Bray et al. (2001) found that the association of family conflict and adolescent alcohol use was significant, similar in strength across broad ethnic groups, and independent of two well-established and strong predictors of adolescent alcohol use—parental disapproval and peer alcohol use. In their study of adolescents ages 10–16 years at Wave 1 through ages 16–22 years at Wave 3, Skeer et al. (2011) found that family conflict predicted an increased risk of substance use disorder. Finally, based on a sample of 10-year-olds followed through to 16 years of age ($n = 854$), Kelly et al. (2011a) found that preceding family conflict predicted alcohol consumption in girls.

The gender-based mechanisms linking family conflict and adolescent alcohol use are unclear; however, it seems likely that adolescent depressed mood mediates the association of these variables. This is because empirical literature using adolescent/young adult populations shows that (a) depressed mood predicts subsequent alcohol use, and (b) family conflict predicts subsequent depressed mood. In support of (a), depressed mood in early adolescence prospectively predicts heavy alcohol use and other drug use (Crum et al., 2008; King et al., 2004; Kumpulainen, 2000). Furthermore, there are gender-based variations in the association of depressed mood and problem drinking in the late teenage years, although findings are not uniform. Two studies show a stronger association between depressed mood and problem drinking for girls compared with boys (Mason et al., 2007; Saraceno et al., 2012), but recent longitudinal research has found no association between depressed mood (at ages 13–19 years) and substance use disorders (at ages 16–22 years) (Skeer et al., 2011).

Why depressed mood may be more strongly predictive of alcohol use for girls compared with boys is unclear. For girls, depressed mood may increase strongly from the early to middle years of puberty (ages 10–13 years) and continue to develop in subsequent adolescent years, whereas for boys, depressed mood may develop earlier but show more gradual

growth or stability over time (Garber et al., 2002; Mason et al., 2007; Saraceno et al., 2012). Because of greater growth in depressed mood during early to middle adolescence, combined with a greater availability of alcohol, girls may be at greater risk for engaging in heavy alcohol use as a means of self-medication to reduce emotional distress (Newcomb and Bentler, 1989). The lack of uniformity of research findings on gender-based differences in the association of depressed mood and alcohol/other drug use may be because these variables are interrelated at a relatively compressed developmental period (early adolescence, 10–13 years of age) and become nonsignificant over developmental periods that stretch into the developmental stage of late adolescence to early adulthood (16–22 years of age).

Several studies have examined the association of family conflict and depressed mood and whether this varies by gender [point (b) above]. Longitudinal research shows that growth in family conflict over the middle to late teenage years predicts stressful life events in young adulthood (age 21 years), which in turn predicts subsequent depressed mood (at ages 21–27 years) (Herrenkohl et al., 2009). Other cross-sectional research has found that interparental conflict is a significantly stronger predictor of adolescent internalizing for girls compared with boys (Davies and Lindsay, 2004; Gore et al., 1993). However, depressed mood does not appear to mediate the link between family conflict (occurring between 10 and 16 years of age) and substance use disorders among young adult females (at ages 16–22 years) (Skeer et al., 2011). On the basis of earlier research, developmental theorists propose that the increasing differentiation of girls and boys at puberty engenders socialization pressures to conform to gender-differentiated social roles, including pressures toward independence and autonomy for boys, and for girls, pressures toward “communion” (or merging of an individual with social networks) (Davies and Lindsay, 2001). The predisposition toward communion may be expressed through increased emotional investment in the well-being of others, particularly with respect to family relationships. Because of this emotional investment, disruptions to family relationships (marked by family conflict) may be more threatening for girls than for boys (Atkinson et al., 2009; Davies and Lindsay, 2004). Also, because of greater socialization toward independence and autonomy, boys may be protected from the adverse impact of family conflict.

The primary goal of the present study was to examine the extent to which early family relationship problems longitudinally predict depressed mood in 13-year-old adolescent girls, thereby increasing the risk of subsequent heavy alcohol use at age 14 years. The study is unique because of its focus on a compressed developmental period that is clearly linked to the heightened impact of family factors (Nash et al., 2005), the growth of depressed mood for girls in particular (Garber et al., 2002; Mason et al., 2007; Saraceno et al., 2012), and the growth in heavy alcohol use that commonly occurs over

this developmental period (Kelly et al., 2011a). The key hypotheses of the present study were that (a) family conflict at Wave 1 (modal age 12 years for this study) would longitudinally predict depressed mood more strongly for girls relative to boys (Wave 2, modal age 13 years), and (b) depressed mood at Wave 2 would predict heavy alcohol use at Wave 3 (modal age 14 years).

This study examined a moderated mediation role for gender and depressed mood, where gender is proposed to moderate the association of family conflict and depressed mood, and depressed mood is proposed to mediate the association of family conflict with heavy alcohol use. To further the current research, we sought to test whether this effect is independent of key correlates of alcohol use and depression, including school commitment, and the number of peers who consume alcohol (Kelly et al., 2011a, 2012a, 2012b). We also controlled for whether parents were living together and a proxy indicator of ethnic background, given research showing that these are modestly related to alcohol use (Dauber et al., 2011).

Method

Sample

Ethics approval was granted by the University of Melbourne's Human Research Ethics Committee and relevant educational authorities. Analyses were based on 969 high school students (57% female) from 12 metropolitan state and Catholic secondary schools in Victoria, Australia. At Wave 1, students were in the first year of high school (mean age 12.33 years, $SD = .49$). Of the analysis sample, 22.9% of adolescents at Wave 3 (age 14 years) reported consuming five or more alcoholic drinks on at least one occasion in their lifetime. Seventy-one percent were from an English-speaking-only background, and 21.1% of adolescents reported that their parents were not living together.

Procedure

A random sample of 20 metropolitan secondary schools in Victoria, Australia, stratified by school type (state and Catholic) and disadvantage (level of entitlement to educational maintenance allowance offered by the state government) were selected from a state-representative sample of schools that had previously participated in a separate study (McMorris et al., 2007) and that were invited to participate in the control arm of an intervention research study. Twelve schools accepted this invitation, with a potential pool of 2,416 students. Following active parental consent and student assent, paper questionnaires were administered to participating students by project staff during school class time.

The parents of 808 students (33.4% of the potential student pool) refused consent and 369 consent forms were not

returned (15.3%), leaving a potential pool of 1,239 students (51.2% of the potential pool). Of those adolescents whose parents returned the signed consent form, nine students were absent, two refused to participate, four provided invalid responses, and one survey was incomplete on all key measures. This left a Wave 1 sample of 1,223 students. A total of 95 (7.8% of Wave 1 sample) and 64 (5.6% of Wave 2 sample) participants were lost at Wave 2 and Wave 3, respectively (13.0% attrition overall). Of those who completed all three waves, 92 participants were excluded because of missing data on the key variables, including depressed mood scores at Wave 2 ($n = 89$) and heavy alcohol use at Wave 3 ($n = 3$). The sample size for bivariate analyses was 969. Because the focus of this study was on the role of family conflict and depression in transitions to heavy alcohol use by Wave 3 (age 14 years), we excluded a further 83 participants who reported heavy alcohol use at Wave 1 from the key longitudinal regression analyses. Fifteen participants in this sample had missing values in one or more predictors other than the key variables of interest, and multiple imputation (Rubin, 1987) was used to fill in the missing values. Five data sets were imputed using the STATA package *ice* (Royston, 2005). The analysis sample consisted of 886 participants (57.4% female).

Although the rates of active parental consent were comparable to related research in the area and attrition rates were comparatively low, the analysis sample (completing all waves) was approximately one third of the potential pool of students in the 12 schools at Wave 1. We tested whether those who remained in the study were different from those who dropped out at any stage for any reason (using *t* tests and chi-square tests). Results indicated that participants who dropped out of the study had higher depressed mood, $t(1203) = 5.46, p < .001$, and higher family conflict, $t(1203) = 4.05, p < .001$, were more likely to have low school commitment, $\chi^2(1) = 5.72, p < .05$, were less likely to live with both parents, $\chi^2(1) = 19.09, p < .001$, and were more likely to report lifetime alcohol use, $\chi^2(1) = 23.45, p < .001$. Gender, age, cultural background, and peers' alcohol use were not significantly associated with dropout ($p > .05$). These results indicated that excluded participants had more severe scores on the key measures.

Measures

Participants completed a modified version of the Communities That Care Youth Survey, an epidemiological instrument designed to measure risk and protective factors (Arthur et al., 2002), which has demonstrated reliability for Australian adolescents (scale α 's generally $> .70$) (e.g., Bond et al., 2000; Brown, 2012; Kelly et al., 2012b).

Key variables. Heavy episodic drinking was measured using the item "How many times have you had five or more alcoholic drinks one after the other?" The original scale was

0 = none, 1 = once in the last 2 weeks, 2 = two times in the last 2 weeks, 3 = three to five times in last 2 weeks, and 4 = six or more times in the last 2 weeks. This variable was recoded into a binary scale (0 or 1 or more times) for the regression analyses to reduce the impact of negative skew. Family conflict was measured using three items on a 4-point Likert scale ranging from 1 = *definitely true* to 4 = *definitely not true*. The items were “We argue about the same things in my family over and over,” “People in my family often insult and yell at each other,” and “People in my family have serious arguments” ($\alpha = .76$). This scale was reverse scored so that higher scores reflected higher levels of family conflict. The mean score for the three items was the derived measure (range: 0–4). Depressed mood was measured using 20 items from the Center for Epidemiologic Studies–Depression Scale (Radloff, 1977), a validated scale for measuring depression, and the response was a 4-point Likert scale where 0 = *not at all*, 1 = *some or a little*, 2 = *occasionally*, and 3 = *most or all the time* (α 's for Waves 1 and 2 were .88 and .86, respectively). The total of the 20 items were subjected to square-root transformations to correct for skewness, and this reduced skewness to an approximately normal distribution (from 1.38 to 0.39). Gender was coded as 0 = male and 1 = female.

Control variables. School commitment was measured using four items: “I try hard in school,” “Doing well at school is important for me,” “Continuing or completing my education is important to me,” and “I feel like I am successful in this school” ($\alpha = .73$). Because school commitment was highly skewed (skewness = -0.99), it was dichotomized at the 80th percentile, with the top 20% representing students who had a very low school commitment. The number of drinking peers was derived from a series of social network questions. Students were first asked to list their friends' names in the questionnaire. For each best friend that was also a participant in the study, the friends' questionnaire responses relating to lifetime alcohol use (present/absent) were matched to each adolescent, providing a collateral estimate of alcohol-using peers for each participant. Compared with self-reporting of peer alcohol use, this method had the advantage of avoiding the tendency to overestimate alcohol use in their immediate peer group and the tendency for males and females to vary in the extent of this overestimation (Lewis and Neighbors, 2004). Parental marital status was assessed with the item, “Are your parents living together/separated or divorced/have never lived together/one or both of my parents have died/something else?” Parents were coded as living together if adolescents endorsed the first item and not living together if they endorsed any other item. Adolescents who reported that one or both parents had died were very low in frequency. Therefore, this response was included in the definition of “no” to preserve statistical power.

Analysis

Statistical analyses were performed with Stata version 11 (StataCorp LP, College Station, TX). Two models were used to test the mediated moderation hypothesis (Edwards and Lambert, 2007; MacKinnon et al., 2002). In Model 1, depressed mood at Wave 2 was regressed on family conflict, gender, and the interaction of family conflict and gender at Wave 1. This allowed the assessment of the effects of family conflict, gender, and their interaction on depressed mood. In Model 2, heavy episodic drinking at Wave 3 was regressed on depressed mood at Wave 2, family conflict, gender, and their interaction at Wave 1 in a logistic model. The model allowed the examination of the effect of depressed mood on heavy episodic drinking. To confirm the mediated moderation hypothesis, we calculated the product of the coefficient, a_1b and $(a_1 + a_2)b$, where a_1 was the regression coefficient of family conflict on depressed mood in Model 1, a_2 was the regression coefficient of the interaction term of family conflict and gender on depressed mood, and b was the regression coefficient of depressed mood on heavy episodic drinking. The terms a_1b and $(a_1 + a_2)b$ represented the mediation effect of family conflict on heavy episodic drinking through depressed mood for males and females, respectively. Statistical significance of the mediation effect was determined by constructing the 95% confidence intervals (CIs) of these two terms with 1,000 bootstrap replicates. For the above two models, age, family structure (parents living together or not), ethnic background (English only spoken at home or not), school commitment, and peer alcohol use were entered as control variables.

Results

Before key analyses, bivariate associations between heavy alcohol use (present/absent) and key and control variables were calculated. On categorical variables (Table 1a), there were significant differences between students reporting heavy alcohol use (present/absent) on school commitment ($p < .05$), peers who reported using alcohol ($p < .001$), and family structure (heavy alcohol users were more likely to have parents who did not live together, $p < .01$). There were no differences in the prevalence of heavy alcohol use for males compared with females or across ethnic backgrounds. Results for continuous variables are presented in Table 1b. Participants who consumed alcohol heavily reported higher levels of family conflict ($p < .05$) and depressed mood ($p < .01$). Table 2 shows the bivariate correlation between family conflict, depressed mood, and heavy episodic drinking at each of the three waves. In this analysis, the original score of heavy episodic drinking (0–4) was used, and Spearman's rank correlation was used to examine the relationship between these variables. At a bivariate level, depressed mood, family conflict, and heavy drinking were significantly cor-

TABLE 1A. Descriptive summary for categorical independent variables, split by heavy alcohol use

Independent variables (Wave 1)	Heavy episodic drinking (Wave 3)				χ^2
	No		Yes		
	<i>n</i>	%	<i>n</i>	%	
Gender					2.95
Male	280	74.3	97	25.7	
Female	403	79.2	106	20.8	
Ethnic background					2.98
English speaking only	478	75.6	154	24.4	
English and other language	205	81.0	48	19.0	
Family structure					7.74**
Parents living together	550	79.0	146	21.0	
Parents not living together	129	69.4	57	30.6	
School commitment					4.02*
High	566	78.6	154	21.4	
Low	117	71.3	47	28.7	
No. of peers with alcohol experience					20.24***
0	201	84.4	37	15.6	
1–2 drinking friends	286	78.8	77	21.2	
3–4 drinking friends	107	71.3	43	28.7	
≥5 drinking friends	89	65.9	46	34.1	

* $p < .05$; ** $p < .01$; *** $p < .001$.

related within and across waves. The correlations across time for heavy alcohol use were generally small in magnitude (.16–.24), and the correlations across time for family conflict and depressed mood were medium in magnitude (.40–.49 and .42–.47, respectively).

Model 1. This model was a multiple regression with depressed mood at Wave 2 as the dependent variable and family conflict at Wave 1, gender, and their interaction term as the key independent variables (Table 3). Main effects were significant for family conflict ($p < .001$) and low school commitment ($p < .001$), and effects for gender, age, and parents not living together were nonsignificant. Consistent with the mediated moderation hypothesis, the interaction of female gender and family conflict was a significant predictor of depressed mood ($p < .05$), and this effect was modest in size. For females, higher family conflict scores at Wave 1 were associated with higher levels of depressed mood at Wave 2.

Model 2. This model was a logistic regression with heavy episodic drinking at Wave 3 as the dependent variable and family conflict at Wave 1 and depressed mood at Wave 2 as the key independent variables (Table 3). Results show that depressed mood at Wave 2 significantly predicted heavy episodic drinking at Wave 3 ($p < .01$, effect size .25), and this effect held after controlling for significant correlates, including gender ($p < .05$), age ($p < .05$), parents not living together ($p < .05$), and number of drinking peers ($p < .05$ to $p < .001$). Family conflict, non-English-speaking background, and low school commitment at Wave 1 were not related to heavy episodic drinking at Wave 3. Bootstrapped products were used to confirm the mediation effect of family conflict on heavy episodic drinking through depressed mood for males and females, respectively (see the *Analysis* section). The estimate of a_1b [cross-product of family conflict and depressed mood where gender = 0 (males)] was 0.041, 95% CI [0.01, 0.10]. The estimate of $(a_1 + a_2)b$ [cross-product of

TABLE 1B. Descriptive summary for continuous independent variables, split by heavy alcohol use

Variable	Heavy alcohol use (Wave 3)				<i>t</i>
	No		Yes		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Age, in years (Wave 1)	12.3	0.5	12.4	0.5	1.83
Family conflict ^a (Wave 1)	1.9	0.8	2.1	0.8	2.34*
Depressed mood ^b (Wave 2)	3.5	1.3	3.8	1.3	3.11**

^aFamily conflict was the average of three items on 4-point scale; the potential range was 1–4, and a higher score indicates more family conflict. ^bDepressed mood was the squared root of the total of 20 items from the Center for Epidemiologic Studies–Depression Scale (Radloff, 1977); the potential range was 0–7.75, and a higher score indicates greater depressed mood.

* $p < .05$; ** $p < .01$.

TABLE 2. Bivariate correlations between family conflict, depressed mood, and heavy episodic drinking at each wave

Wave	Variable	Wave 1			Wave 2			Wave 3	
		Heavy drinking	Family conflict	Depressed mood	Heavy drinking	Family conflict	Depressed mood	Heavy drinking	Family conflict
Wave 1	Heavy drinking	1.00							
	Family conflict	.18***	1.00						
	Depressed mood	.20***	.42***	1.00					
Wave 2	Heavy drinking	.24***	.07*	.10**	1.00				
	Family conflict	.15***	.49***	.30***	.18***	1.00			
	Depressed mood	.15***	.27***	.47***	.21***	.44***	1.00		
Wave 3	Heavy drinking	.16***	.07*	.07*	.37***	.12***	.10**	1.00	
	Family conflict	.11**	.40***	.23***	.11**	.53***	.29***	.14***	1.00
	Depressed mood	.09**	.20***	.42***	.08*	.26***	.55***	.13***	.38**

Notes: Heavy alcohol use (Wave 1) was not used in the key analysis. However, this variable is included in Table 2 because post hoc analyses included a cross-sectional analysis of the role of depressed mood in mediating family conflict and heavy alcohol use.
* $p < .05$; ** $p < .01$; *** $p < .001$.

(family conflict + interaction) and depressed mood, where gender = 1 (females)] was 0.080, 95% CI [0.02, 0.15]. Both confidence intervals for these two product terms did not cover zero. This indicated that family conflict had a significant effect on depressed mood (effect size .23), which in turn increased the likelihood of heavy episodic drinking, and the effect of family conflict on depressed mood was stronger for females than for males.

Supplementary analyses were conducted to explore support for the temporal precedence of family conflict and depressed mood for the onset of heavy alcohol use at Wave 3. For these analyses, participants who reported heavy alcohol use before Wave 3 were excluded (leaving $n = 771$), enabling a clearer test of the extent to which family conflict and depressed mood predicted heavy alcohol use (yes/no) at Wave 3. The first supplementary analysis was the same as Model 1 except that depressed mood (Wave 1) was included in the model. The key results were that being female (relative to male), family conflict (Wave 1), and depressed mood (Wave 1) were significant predictors of depressed mood (Wave 2) (female: $\beta = .32$, 95% CI [0.16, 0.48], $p < .001$; family con-

flict: $\beta = .18$, 95% CI [0.06, 0.29], $p < .01$; depressed mood (Wave 1): $\beta = .42$, 95% CI [0.34, 0.50], $p < .001$). These results suggested that family conflict remained a significant predictor of subsequent depressed mood after accounting for depressed mood in the preceding wave. Contrary to the core analyses, the Gender \times Family Conflict interaction term was nonsignificant in this model. However, statistical power to detect a significant interaction effect of gender and family conflict was likely reduced because of gender-based variation in depressed mood, particularly at young ages (Garber et al., 2002; Mason et al., 2007; Saraceno et al., 2012) and because of the relatively high autocorrelation of depressed mood across Waves 1 and 2 (0.47, $p < .001$; Table 2).

To clarify the extent to which depressed mood at Wave 2 was related to the onset of heavy alcohol use at Wave 3, the second supplementary analysis regressed heavy alcohol use (Wave 3) on being female (relative to male), family conflict (Wave 1), and depressed mood (Wave 2). The results of this analysis were that depressed mood (Wave 2) predicted heavy alcohol use (Wave 3) (odds ratio = 1.19, $p < .05$, 95% CI [1.02, 1.40]), and gender and family conflict were nonsig-

TABLE 3. Regression coefficients and the associated estimates from Model 1 and 2

Wave 1 predictors	Model 1 Depressed mood (Wave 2)		Model 2 Heavy alcohol use (Wave 3)	
	β	[95% CI]	OR	[95% CI]
Female	-.03	[-0.45, 0.4]	0.40*	[0.17, 0.97]
Age	.04	[-0.13, 0.2]	1.45*	[1.05, 2.02]
Family conflict	.28***	[0.13, 0.43]	1.01	[0.75, 1.36]
Female \times Family Conflict	.22*	[0.02, 0.42]	1.28	[0.86, 1.93]
Parents not living together	-.02	[-0.22, 0.18]	1.56*	[1.07, 2.27]
Non-English-speaking background	.15	[-0.03, 0.33]	0.83	[0.57, 1.21]
Low school commitment	.40***	[0.19, 0.6]	1.26	[0.84, 1.89]
Number of drinking peers (ref: none)				
1–2 drinking peers	-.05	[-0.24, 0.15]	1.60*	[1.02, 2.49]
3–4 drinking peers	-.21	[-0.46, 0.03]	2.55***	[1.52, 4.27]
≥ 5 drinking peers	.01	[-0.25, 0.26]	3.00***	[1.79, 5.03]
Depressed mood at Wave 2			1.21**	[1.06, 1.38]

Note: Ref. = reference.
* $p < .05$; ** $p < .01$; *** $p < .001$.

nificant predictors of heavy alcohol use (Wave 3). Together, these results provided a conservative test consistent with the hypothesis that family conflict (Wave 1) does not directly predict heavy alcohol use (Wave 3). Rather, family conflict (Wave 1) indirectly predicts the onset of heavy alcohol use (Wave 3) via its association with depressed mood (Wave 2).

Discussion

Building on cross-sectional research showing that family conflict and alcohol use are significantly related for girls, this is the first known study to examine gender-based longitudinal variations in the links between family conflict (Wave 1, age 12), depressed mood (Wave 2, age 13), and heavy alcohol use (Wave 3, age 14). The results were consistent with the moderated mediation hypothesis. Family conflict predicted subsequent depressed mood in both boys and girls, this effect was more significant for girls, and depressed mood predicted subsequent heavy alcohol use. These core results are summarized in Figure 1. The strengths of the study included its three-wave longitudinal design, the comparatively low rates of attrition (13.4%), controls for variables known to be important correlates of heavy alcohol use, and supplementary analyses demonstrating that effects for family conflict on depression and depression on heavy alcohol use were resilient to autocorrelative effects. The present study is one of the first to examine how family factors and mental health factors interact to predict heavy alcohol use in the early teenage years. In particular, the present study points to ways in which risks potentially unfold over the early teenage years, particularly for girls, and it suggests that the unfolding of risks occurs earlier and over a more compressed developmental period than has previously been demonstrated (Skeer et al., 2011).

The results point to the value of further research on why adolescent gender variations in the family conflict–depression–heavy alcohol use paths are significant, particularly

for girls. Three mechanisms that account for the potential impact of family conflict on adolescent adjustment have been empirically evaluated. Focusing mostly on interparental conflict and adolescent self-esteem (a significant predictor of mental health outcomes), these mechanisms highlight the importance of adolescents' cognitive appraisal of the meaning of interparental conflict (e.g., "I am responsible for problems in my family") (Grych, 1998; Shelton and Harold, 2008) and "spillover" of interparental conflict into parenting quality (where resources for effective parenting are depleted by interparental conflict; Erel and Burman, 1995; Siffert et al., 2012). Other research suggests that girls are more vulnerable to family stress than boys, that family stress is more predictive of depressed mood for girls than boys, and that girls may be more likely to engage in avoidant coping than boys (Kort-Butler, 2009). Although caution is needed in overstating gender differences in coping style and related constructs (the similarities across genders are more apparent than the differences; Kort-Butler, 2009), the present study points to the need for further longitudinal investigation of intrapersonal cognitive factors underlying the gender-oriented association of family conflict and depressed mood. Notably, there was a main effect for family conflict on depressed mood. Therefore, although the effect of family conflict on depressed mood seemed more pronounced for girls, there was a significant association irrespective of gender.

The findings have several implications for the prevention of heavy alcohol use in middle adolescence. First, the originating role of family conflict in subsequent heavy alcohol use points to the importance of managing family conflict during early developmental transitions irrespective of gender, but this may be even more important for girls compared with boys. Parent-/family-oriented prevention programs that emphasize communication skills training and conflict management are effective (Spath et al., 2001, 2002, 2009), but such programs are not widely used, and this study reinforces the potential value of family-based prevention, particularly

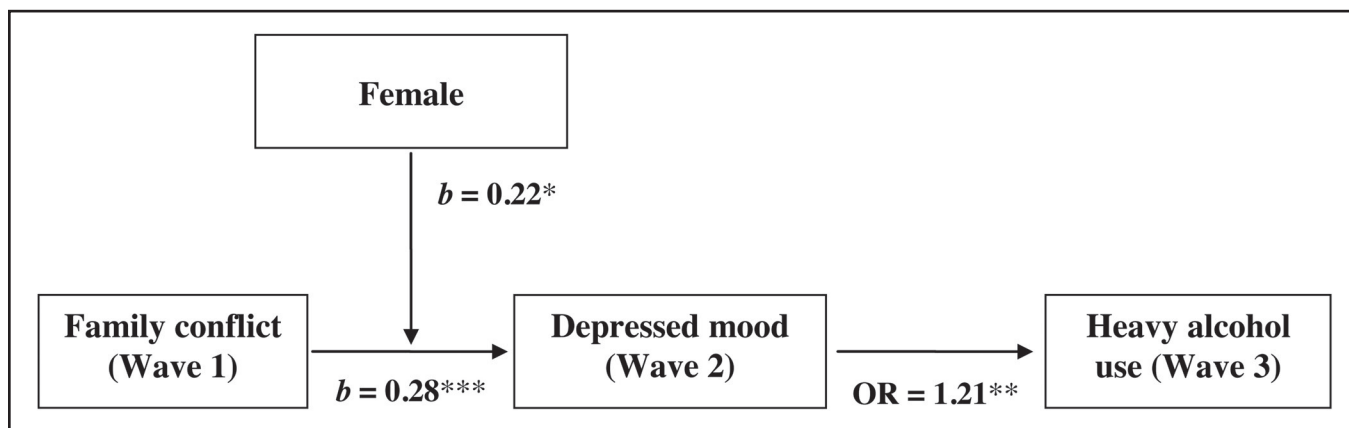


FIGURE 1. A visual summary of the mediated moderation relationship between family conflict, gender, depressed mood, and heavy alcohol use
* $p < .05$; ** $p < .01$; *** $p < .001$.

in the early stages of adolescence. Existing evidence-based parent-/family-oriented prevention programs may benefit from an added focus on the potential gender-based impact of family conflict and, potentially, the different meanings that family conflict often has for girls compared with boys (Atkinson et al., 2009). Other researchers have called for prevention programs that are sensitive to the specific needs of girls (Fang et al., 2009; Kumpfer et al., 2008; Schinke et al., 2009), with results for programs targeting young adolescent girls' relationships with their mothers showing positive results (Schinke et al., 2009). The finding that depressed mood in the early stages of adolescence predicts subsequent heavy alcohol use reinforces the utility of screening and the value of universal programs designed to reduce depression and increase resilience (Roberts et al., 2003; Shochet et al., 2001).

Despite its longitudinal design, the present study is subject to several limitations. Although the study established a temporally related series of effects, the study cannot demonstrate causality. It is plausible that causal factors go in other directions to those hypothesized or that associations are epiphenomenal. We examined a theoretically driven longitudinal permutation (family conflict–depression–heavy alcohol use). Other permutations (a field of at least six) were not explored because of a poor theoretical underpinning, because the focus of the study was on determinants of heavy alcohol use, and as a result of the risk of finding significant results because of the number of tests conducted. The study is limited by potential biases associated with pathways to participation in the survey. Whereas the rates of parental consent in the present study were comparable to other studies of adolescent substance use, active parental consent tends to bias samples downward in terms of alcohol use and other problems (Kelly and Halford, 2007). Therefore, the findings of this study may not generalize to families with more significant problems. Adolescents who dropped out of the study had elevated scores on key variables relative to adolescents who did not drop out, and it is possible that the relationships found in the present study do not generalize to adolescents who have more extensive problems. Finally, the present study, by virtue of its focus on transitions to heavy alcohol use, excluded very young adolescents who were already engaging in heavy alcohol use. Therefore, the results may not generalize to individuals with particularly deviant patterns of alcohol use and related problems. The alcohol-specific findings may be limited by reliance on a single dichotomous outcome. Although we excluded participants whose responses were clearly unreliable, the study relies on self-report data.

Conclusion

Family conflict is indirectly related to alcohol use, and there was evidence that this effect is mediated by depres-

sion and moderated by gender. More longitudinal research is needed to understand how family conflict is differently appraised by girls versus boys, whether family-oriented strategies targeting conflict management at highly vulnerable ages may be beneficial, and whether such prevention strategies have added protective effects for girls' adjustment in the early to middle teenage years. At present, widely used alcohol-related prevention programs may be delivered too late and may be missing important pathways to heavy alcohol use.

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