



## Short Communication

# The association of puberty and young adolescent alcohol use: Do parents have a moderating role?



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## HIGHLIGHTS

- Highlights the role of family functioning on alcohol use in the context of puberty
- Examines positive and negative family functioning in very early adolescents
- Accounts for school level clustering effects in a large sample of school students

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## ABSTRACT

**Purpose:** To explore the extent to which parent–adolescent emotional closeness, family conflict, and parental permissiveness moderate the association of puberty and alcohol use in adolescents (aged 10–14).

**Methods:** Cross-sectional survey of 7631 adolescents from 231 Australian schools. Measures included pubertal status, recent (30 day) alcohol use, parent–adolescent emotional closeness, family conflict, parental permissiveness of alcohol use and peer alcohol use. The analysis was based on a two-level (individuals nested within schools) logistic regression model, with main effects entered first, and interaction terms added second.

**Results:** The interaction of family factors and pubertal stage did not improve the fit of the model, so a main effect model of family factors and pubertal stage was adopted. There were significant main effects for pubertal stage with boys in middle puberty at increased odds of alcohol use, and girls in advanced puberty at increased odds of alcohol use.

**Conclusions:** Puberty and family factors were strong predictors of adolescent alcohol use, but family factors did not account for variation in the association of pubertal stage and alcohol use.

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## 1. Introduction

Alcohol use and misuse increase during early adolescence (10–14 years of age) (Kelly, O'Flaherty, Toumbourou, et al., 2011), and adolescents who are advanced in their pubertal development may be ill-prepared for contextual influences on alcohol use (Hummel, Shelton, Heron, Moore, & van den Bree, 2013). Early pubertal development predicts substance use (Kelly et al., 2012), and effects are independent of age (Kaltiala-Heino, Koivisto, Marttunen, & Fröjd, 2011).

Relatively little research has focused on early adolescents, when alcohol use often emerges, and pubertal development begins.

Parents have an important protective role in reducing alcohol-related risks (Kelly, O'Flaherty, Toumbourou, et al., 2011). Key protective factors include communication of clear rules about alcohol non-use (Habib et al., 2010; Simons-Morton, 2004), providing a safe and secure emotional environment (Choquet, Hassler, Morin, Falissard, & Chau, 2008; Luyckx et al., 2011), and effectively managing family distress (Chan, Kelly, & Toumbourou, 2013; Kelly, Toumbourou, et al., 2011). Based on Contextual Amplification Theory (Ge, Brody, Conger, Simons, & Murry, 2002), parenting may amplify existing risks of pubertal development on alcohol use.

Research on the interplay of parenting, pubertal development, and alcohol use is comparatively rare (Hummel et al., 2013). Prior research

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has focused on negative family factors such as lax supervision, harsh/inconsistent parenting, family violence (Costello, Sung, Worthman, & Angold, 2007), and positive factors, such as warmth, love, and caring behaviors (Shelton & van den Bree, 2010). These studies indicate that when family relationship quality is low, the risk of alcohol use is elevated for early maturing girls but not boys (Costello et al., 2007; Shelton & van den Bree, 2010). Other research show that family factors may hasten pubertal development (Belsky et al., 2007; Ellis, 2004; Ellis & Essex, 2007; Ellis & Garber, 2000; Moffitt, Caspi, Belsky, & Silva, 1992) and externalizing behaviors (Ellis et al., 2003; Ge et al., 2002).

This study examined the extent to which positive and negative dimensions of family relationships moderated the association of pubertal development and alcohol use. This is important to evaluate, because different studies show each to be significantly related to alcohol use in early maturing girls, yet these dimensions are obliquely related, and there are gender differences in how alcohol use develops in response to family problems (Chan et al., 2013; Kelly, O'Flaherty, Toumbourou, et al., 2011). We examined these associations in a large sample of young adolescents (10–14 years of age), given the importance of this age period in the development of alcohol use and the significant role of parents in this developmental period relative to later periods (Bray, Adams, Getz, & Baer, 2001). Controls included age, parental substance use, involvement in peer drinking networks, and school-level variance in alcohol use. Following Costello et al. (2007) and Shelton and van den Bree (2010), we hypothesized that family factors would moderate the association of pubertal stage with alcohol use, with this effect most pronounced for girls.

## 2. Methods

### 2.1. Participants

Participants were students who participated in the Healthy Neighbourhoods Study in 2006. The survey involved 7866 students (10–14 years old) from 231 schools located in 30 communities across three States in Australia ( $N = 7866$ ). Surveys were administered in school classrooms (Jacka et al., 2010). Communities were selected by random stratification according to socioeconomic disadvantage (Australian Bureau of Statistics, 2009). Within each community, primary ( $n = 164$ ) and secondary schools ( $n = 82$ ) were invited to participate, 83% of schools ( $n = 443$ ) responded, and 52% of schools agreed to participate. Students only participated if signed parent consent was obtained (67%), and 92% of students who returned permission forms consented to participation. The survey was web-based and completed at school (paper copies available if needed). The research was approved by an Institutional Research Ethics Committee.

Of the full sample, 152 participants were excluded because of low self-report reliability (see 2.2), 41 were excluded due to missing values for alcohol consumption, 22 did not report their age, and 515 did not respond to puberty items. The final analysis sample consisted of 7136 adolescents (91% of the consented sample, 47% male, modal age 12). Compared to those meeting inclusion criteria, excluded participants were more likely to be male ( $\chi^2 = 5.55, p < .05$ ).

### 2.2. Measures

Measures were based primarily on the *Communities That Care Youth Survey* (Arthur, Hawkins, Pollard, Catalano, & Baglioni, 2002; Glaser, Van Horn, Arthur, Hawkins, & Catalano, 2005).

*Recent alcohol use* was measured using the item "In the past 30 days have you had more than just a few sips of an alcoholic beverage (like beer, wine or spirits)?" (0 'No', 1 '1–2 times', 2 '3–5 times', 3 '6–9 times', 4 '10 or more times'). Scores were collapsed to create a binary variable (any alcohol use, yes/no).

*Pubertal development* was measured using a modified self-report version of the Pubertal Development Scale (PDS) (Petersen, Crockett, Richards, & Boxer, 1988) which has been validated for Australian school

use (Bond et al., 2006). Both males and females completed 3 items about their height, body hair growth and skin changes on a 4-point scale (0 'has not started yet', 1 'has barely started', 2 'has definitely started', 3 'seems complete'). Males and females completed two other gender-specific items (males; "Have you begun to grow hair on your face?" and "Have you noticed a deepening of your voice?"; females; "Have you noticed that your breasts have begun to grow?" and "Have you begun to menstruate (started to have your period)?"). Summed scores were used to capture overall pubertal development for males/females ( $\alpha = .74/.75$  respectively). Based on summed scores, participants were categorized according to Tanner Stage (Patton et al., 2004; Tanner & Whitehouse, 1976). Only 6% of the participants were in Tanner Stage I (start of physical maturation) and only 1% of participants were in Tanner Stage V (completion of physical maturation). Therefore, Tanner Stages were collapsed into *initial puberty* (Stage I/II, 34% of the sample), *middle puberty* (Stage III, 38%) and *advanced puberty* (Stage IV/V, 28%) (Patton et al., 2004).

*Parent-child emotional closeness* was measured separately for mothers and fathers with three items (e.g., "Do you feel very close to your mother/father?"), 1–4 point scale,  $\alpha = .80/.82$  for mothers/fathers). *Family conflict* was measured with three items (e.g., "people in my family often insult and yell at each other", 1–4 point scale,  $\alpha = .79$ ). *Parental permissiveness* was measured separately for beer/wine and spirits (e.g. "How wrong do your parents feel it would be for you to drink beer or wine/spirits regularly (at least once or twice a month)?", 1 'Not wrong at all', 2 'A little bit wrong', 3 'Wrong', 4 'Very wrong',  $\alpha = .85$ ). *Involvement in peer drinking networks* was assessed with the question "How many of your best friends have tried alcohol (like beer, wine or spirits) when their parents didn't know about it?" (0–4). Scores were collapsed to a binary variable (0/1+) (Kelly, O'Flaherty, Connor, et al., 2011; Kelly et al., 2012). *Parental alcohol use* was measured separately for mother and father, "Does your mother/father drink alcohol?" (0 'Never' to 3 'Everyday'). *Parental education* was measured with the items 'What is your mother/father's highest level of education?' (1 'Didn't complete high school', 2 'Completed high school', 3 'Has a degree from a university'). Adolescents were excluded if they reported low self-report reliability by endorsing the question "I was not honest at all" (about completing the survey) or the use of a fictitious drug.

### 2.3. Analysis plan

Statistical analyses were performed with STATA 11 (StataCorp, 2009). The main statistical design was a 2-level logistic regression model (individuals nested within schools), with random effect estimations for school, and recent alcohol use (present/absent) as the dependent variable. The influence of *pubertal stage* was measured separately for each gender. Power analyses were estimated using G\*Power 3 (Faul, Erdfelder, Buchner, & Lang, 2009). To detect OR = 1.2 at 80% power, a sample of 961 is required, so the present sample was easily sufficient. In a stepped approach, main effects were entered into the models first followed by key interactions simultaneously. Best fit of main effect versus interaction models was determined using Likelihood-ratio tests.

## 3. Results

### 3.1. Preliminary analyses

A higher proportion of boys had consumed alcohol ( $p < .001$ ), and as expected, alcohol use was related to advanced pubertal stages ( $p < .001$ ) (see Table 1). There were lower levels of emotional closeness, higher levels of family conflict, and more parent permissiveness of alcohol use in adolescents who had consumed alcohol compared to those who had not ( $ps < .001$ ). There were comparable numbers of boys and girls in *middle* puberty, but most boys (52%) were at the *initial* stage. A larger proportion of girls were in the *advanced* stage of puberty (40% compared to 12% for boys).

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