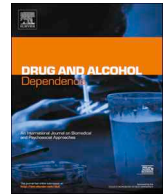




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# Alcohol expectancies change in early to middle adolescence as a function of the exposure to parental alcohol use

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## ABSTRACT

**Introduction:** The subjective effects of alcohol, i.e., alcohol expectancies (AE), are important predictors of alcohol use. This three-year longitudinal study examined: 1) the development of enhancement, social, coping, and conformity AE from age 10–16; 2) the association between parental alcohol use exposure and positive AE among adolescents and between exposure and changes in AE over the six month period and 3) the moderating effect of gender on the association between exposure and change in AE.

**Methods:** A longitudinal study followed adolescents between 10-13-years old at baseline (N = 755; 45.6 % boys) in six months intervals for three years, resulting in seven measurements.

**Results:** Adolescents most strongly endorsed enhancement AE. Social and coping AE dimensions positively increased over time. The estimated Multilevel Model of Change revealed that exposure to either fathers 'or mothers' alcohol use predicted an increase in social AE six months later (B = .129, SE = .032). Exposure to fathers' drinking predicted an increase in enhancement AE for boys (B = .075, SE = .031) but not for girls (B = -0.045, SE = .030). No associations between parental exposure and other AE dimensions were found.

**Conclusion:** The results add to previous studies in showing that the association between parental drinking behavior and offspring AE develops within short periods. Prevention should, therefore, include explicit guidelines for parents with respect to how their drinking behavior affect their offspring.

## 1. Introduction

The subjective effects of alcohol, i.e., alcohol expectancies (AE), are important in explaining why people drink. AE start developing early in childhood, even long before adolescents start using alcohol (Kuntsche et al., 2016; Kuntsche and Kuntsche, 2018; Smit et al., 2018b; Voogt et al., 2017a). AE have been recognized as important precursors of the motivation to use alcohol (Brody et al., 2000; Jones et al., 2001; Pieters et al., 2014; Smit et al., 2018b). The few studies that aimed to explain the development of AE have identified parental alcohol use and exposure to parental use as crucial factors (Jones et al., 2001; Smit et al., 2018b). This is important since the transition of AE into their respective drinking motives also occurs in this early stage (Kuntsche et al., 2010). However, recent systematic reviews showed that most studies did not consider the degree to which offspring see their parents drinking, i.e., their exposure to parental alcohol use (Rossow et al., 2016; Ryan et al., 2010; Smit et al.,

2018b), which in terms of modeling is likely to have a more profound effect on offspring's cognitions. The aim of this study was to examine whether exposure to parental alcohol use increases AE among young adolescents. According to the Motivational Model of Alcohol Use (Cox and Klinger, 1990, 1988), four different AE dimensions emerge by crossing the dimensions valence (positive vs. negative reinforcement) and source (personally vs. socially): enhancement (i.e., to obtain positive feelings), coping (i.e., to avoid or reduce negative feelings), social (i.e., to obtain social rewards) and conformity (i.e., to avoid social rejection). Previous studies on AE, based on different dimensions (e.g., social benefits, motor enhancement), showed that positive AE tend to increase over time (Schell et al., 2005), particularly in early adolescence (Cameron et al., 2003; Copeland et al., 2014; Smit et al., 2018b). Since AE are important drivers of cognitions (drinking motives) and behavior (Jones et al., 2001) and experimenting with alcohol often occurs in early adolescence (Inchley et al., 2002), it is important to understand the development of AE in

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adolescence and its proximal predictors. Learning about the reinforcing effects of alcohol depends strongly on observed or personal experiences with alcohol (Campbell and Oei, 2010; Smit et al., 2018b). Besides friends, parents remain important socialization agents and sources of observational learning (Campbell and Oei, 2010; Leung et al., 2014; Rossow et al., 2016; Steinberg, 2005). Indeed, many studies have focused on parental alcohol use as a predictor of offspring's acquisition and development of AE over time, demonstrating that parent's drinking predicts positive AE over time (Cumsille et al., 2000; Smit et al., 2018b) even when adolescents had not yet initiated alcohol consumption (Ting et al., 2015). It is highly likely that a discrepancy exists between how often parents drink and how often their children see them drinking. Therefore, more insight is needed regarding potential explanations of why adolescents form AE over time, based on their parents' drinking behavior. The Social Learning Theory (Bandura and McClelland, 1977) and the Cognitive Model of Intergenerational Transference (Campbell and Oei, 2010) posit that the degree to which a behavior is *observed* is important in the uptake of cognitions and behaviors. Consequently, adolescents might adopt their AE in accordance with their observations of their parents' behaviors. Parents tend to particularly highlight the positive outcomes of alcohol use and avoid showing the negative outcomes resulting from excessive drinking (Jayne and Valentine, 2017). As a result, offspring may model positive cognitions concerning outcomes of alcohol use. In one previous study, we found that the exposure to parents' alcohol use, rather than parental alcohol use *per se*, has an effect on positive AE (Smit et al., 2019), which shows that the distinction between general measures of parental alcohol use and parental alcohol use is important. It remains unclear, however, whether exposure to parental alcohol use is associated with the acquisition and development of AE in adolescence over time. Another important caveat in the current literature is that most studies on the development of AE have not investigated developmental sequences shorter than a year (Smit et al., 2018b). This is unfortunate because adolescence is a period that is characterized by rapid developments in social, psychological and physiological aspects (Steinberg, 2005), including changes in AE (Copeland et al., 2014). Adolescents orient themselves toward an adult status (Steinberg, 2008), and thus are likely to be sensitive to learning about the effects of alcohol from the adults close to them (Smit et al., 2018b). However, such modeling effects are supposed to occur in a shorter time than the one-year interval used in previous studies (Goldman, 1994; Jones et al., 2001; Smit et al., 2018b). Therefore, this study followed 10-13-year olds (at baseline), at six-month intervals for three years, resulting in seven measurements in total. This study expands the literature on the role of parental alcohol use on offspring's AE in three ways. First, we aimed to gain insight into the acquisition and development of enhancement, social, coping, and conformity AE among early adolescents. Second, we examined whether exposure to fathers' and mothers' alcohol use is associated with AE from a given moment to the next (six months intervals) over a three-year period. We hypothesized that the exposure to fathers' and mothers' drinking was associated with positively reinforcing AE (i.e., AE regarding enhancing and social benefits of alcohol). Second, we examined whether AE changed as a function of exposure to fathers' and mothers' alcohol use while controlling for previous levels of AE (e.g., AE at 18 months follow-up were controlled for AE at 12 months follow-up), again expecting positively reinforcing AE to change as a function of exposure. Third, given the mixed gender-specific findings in the development of AE (Handley and Chassin, 2013; Kuntsche and Kuntsche, 2018; Mares et al., 2015; Smit et al., 2019), we explored whether gender moderated the association between exposure to fathers' and mothers' drinking and change in AE.

## 2. Materials and methods

### 2.1. Procedure

Data were drawn from a multi-informant seven-wave longitudinal family study (Smit et al., 2019, 2018a). Starting in 2015, a nationally representative sample of young adolescents (aged ten to thirteen at

baseline) and their mothers, were recruited from 123 primary schools. Information on the study was provided through presentation(s) to pupils and their parents, and letters inviting them to participate in the study were distributed. To register for the study, preteens and parents provided informed consent via the study website (<http://www.vol-onderzoek.nl>). At baseline, paper and pencil questionnaires were administered to pupils in the classrooms. In the same week, mothers were e-mailed and asked to complete the online questionnaire. In the following three years, online questionnaires were sent to adolescents every six months and to their mothers every twelve months. Yearly monetary incentives (€10) were provided to both adolescents and their mothers. The ethics committee of the Faculty of Social Sciences approved the study procedures (ECSW2014-2411-272).

### 2.2. Participants

Families from 104 of the 123 participating schools opted to take part in the study, resulting in 765 adolescents (45.6 % male,  $M_{\text{age}} = 11.78$ ,  $SD = .49$  at baseline). Most adolescents were born in the Netherlands (97.6 % of adolescents). More information on recruitment and demographics can be found in Smit et al. (2019, 2018b). Although retention rates were high (92 % of adolescents participated in all data collection waves), attrition analyses were conducted. Chi-square tests indicated that adolescents' gender ( $\chi^2_{(df=1)} = .686$ ,  $p = .408$ ) and school level ( $\chi^2_{(df=2)} = 2.291$ ,  $p = .334$ ) did not significantly predict dropout at T6. Moreover, independent sample *t*-tests indicated no differences in age at baseline ( $t(763) = 1.52$ ,  $p = .130$ ), exposure to fathers' alcohol use ( $t(740) = .05$ ,  $p = .961$ ), exposure to mothers' alcohol use ( $t(750) = .78$ ,  $p = .434$ ), enhancement AE ( $t(752) = .25$ ,  $p = .801$ ), social AE ( $t(752) = -.87$ ,  $p = .384$ ), coping AE ( $t(752) = .05$ ,  $p = .958$ ), and conformity AE ( $t(752) = .33$ ,  $p = .741$ ).

### 2.3. Instruments

**Demographics** (baseline = T0). Adolescents reported gender and age. **Exposure to parental alcohol use** (T0-T6) was assessed for mothers and fathers separately. Adolescents reported how often they saw their parents drinking in nine out of 18 family-specific situations that parents deemed most common, such as a family barbecue or a birthday party (Voogt et al., 2019). Responses were recorded on a five-point Likert scale ranging from 0 (*never*) to 4 (*always*). Exposure to parental alcohol use was used in the analyses as observed mean scores for mothers and fathers separately. The scores showed a high internal consistency (average Cronbach's alpha over time:  $\alpha_{\text{father}} = .92$ ,  $\alpha_{\text{mother}} = 0.92$ ). **Alcohol Expectancies** (T0-T6): Alcohol expectancies were assessed using 12 items derived from the Drinking Motive Questionnaire Short Form (DMQ-R SF; Kuntsche and Kuntsche, 2009). For the purpose of this paper, items formulated as motives (i.e., *I personally drink to achieve X*) were transformed expectancy items (i.e., *After drinking, I expect X to occur for people in general*) (Kuntsche et al., 2010), resulting in four AE dimensions: enhancement, coping, social, and conformity. Response categories ranged from 0 (very unlikely) to 4 (very likely). AE were included as mean scores. Internal consistencies were moderate to high over time (average Cronbach's Alpha over time:  $\alpha_{\text{enhancement}} = 0.64$ ,  $\alpha_{\text{social}} = 0.83$ ,  $\alpha_{\text{coping}} = 0.77$ ,  $\alpha_{\text{conformity}} = 0.69$ ). **Adolescent alcohol use** (T0-T6): At every wave, we asked the adolescents whether they consumed alcohol within the past six months (i.e., recent use) or not. Response categories ranged between 0 (no alcohol use) and 1 (six months ago) to 7 (in the past week), which was recoded into a dichotomous variable (0 = no recent use, 1 = recent use).

### 2.4. Analytical strategy

Out of 4590 potential data points ( $N = 765 \times 6$  waves), 4288 data points (93.4 %) were available. The missing values were considered by utilizing the Full-Information Maximum Likelihood option in Mplus (Enders and Bandalos, 2001). Descriptive statistics and paired samples

t-tests were used to test baseline differences between the four scales of AE and between exposure to father's and mother's alcohol use. To test the hypothesis that whenever alcohol exposure occurs within the three-year follow-up period *changes* in the offspring's AE would be observed six months later, we restructured the dataset to obtain up to six time pairs for each participant (Fig. 1).

We estimated a linear Multilevel Model of Change in the Mplus 7.4 software in three steps (Alasuutari et al., 2008; Muthén and Muthén, 2010). In the first model, we tested whether exposure to parental alcohol use predicted AE six months later for each AE dimension separately (Model 1.1–1.4). In the second model, we added AE at T0 to assess whether exposure predicts changes in AE (Model 2.1–2.4). In the third model, we included gender and age as between-level factors to formally test whether the effect of exposure to father's or mother's alcohol use on changes in alcohol expectancies are different for boys and girls (Model 3.1–3.4). For ease of interpretation, we reported the gender-specific models (i.e., multi-group analyses) to examine links in the two groups separately and plotted the multilevel model results in a graph.

To examine whether AE increase over time, we included time as a within-level covariate in all models to investigate the role of the T0-T1 association over the three-year follow-up period (which was not assumed). Moreover, since adolescent alcohol use accounted for a significant amount of variance in AE (Smit et al., 2018b), we examined whether the results change when including alcohol use as a time-varying covariate (0 = no recent use, 1 = recent use). The Maximum Likelihood Robust (MLR) estimator was used to account for deviation from the normal distribution.

### 3. Results

#### 3.1. Descriptive statistics

Alcohol expectancies and their changes over time (i.e., the association of AE with timepoint) are presented in Table 1. In general, mean scores of social and coping AE increase over time, as indicated by the associations of time point with social and coping AE. A paired samples *t*-test with aggregated mean exposure scores showed that adolescents reported more exposure to alcohol consumed by fathers ( $M = 1.49, SD = .86$ ) on average, compared to mothers ( $M = 1.23, SD = .84$ ),  $t(763) = 9.01, p < .001$ .

Bivariate associations indicated that both father's and mother's exposure were positively associated with social and coping AE (Table 2), indicating that adolescents who reported seeing their parents drinking reported more positive AE and vice versa. However, effect sizes were weak ( $t_0 > t_1$ ).

#### 3.2. Multilevel model of change

The multilevel regression models showed that higher exposure to either fathers' or mothers' alcohol use was associated with higher social AE six months later (Model 1, Table 3). This association remained when controlling for the previous level of AE (Model 2), i.e., for the change from a given level of social AE at T0 to six months later. Exposure to fathers' and mothers' alcohol use was not associated with any other AE. The results did not change after controlling for recent alcohol use<sup>1</sup>.

When conducting a multigroup model that included gender<sup>2</sup>, gender was significantly associated with the slopes of the association of fathers' exposure ( $B = .119, SE = .039, p = .002$ ) and mothers' exposure ( $B = -.091, SE = .038, p = .009$ ) with enhancement AE. This indicates that the associations were different for girls compared to boys

(reference group). For social, coping, and conformity AE, the associations were not significantly different from the reference group for fathers' and mothers' exposure (all  $ps > .10$ ). The multi-group model showed that higher levels of father's exposure were associated with a change in enhancement AE over time for boys but not for girls (Table 4). Mother's exposure was not associated with enhancement AE for boys and girls. The gender-specific results are illustrated in Fig. 2.

### 4. Discussion

The current study investigated whether exposure to parental alcohol use was associated with a change in enhancement, social, coping, and conformity AE among adolescents over a period of three years with six-month intervals (seven measurements). We found that adolescents most strongly endorsed enhancement AE and that social and coping AE increased with time. Regarding exposure to parental alcohol use as a predictor of AE over time, it appeared that both mothers' and fathers' consumption predicted more social AE six months later even when controlling for previous levels of AE. No associations between exposure to parental alcohol use and other AE dimensions were found. We *did* find one gender-specific association, showing that fathers' exposure was associated with the development of enhancement AE for boys but not for girls. The current study is among the first to focus on the development of AE based on the Motivational Model of alcohol use, which resulted in a valence-source classification of AE (Kuntsche et al., 2010). Regarding the development of different AEs over time, youths reported mostly enhancement AE (e.g., people drink because it makes them feel good), followed by social, coping, and conformity AE. A positive association between time points suggested that social and coping AE increased over the course of three years. This demonstrated that AE on "alcohol makes people more sociable" and "alcohol makes you forget about problems" increase on the average in early through mid-adolescence. The findings that high levels of enhancement AE are already endorsed in early adolescence and that social and coping AE increase in early to middle adolescence provide valuable information, as they predict corresponding drinking motives and alcohol-related behavior later in life (Bradizza et al., 1999; Cho et al., 2019; Diep et al., 2016; Hasking et al., 2011). The current study further indicated that parental alcohol use exposure is one of the factors responsible for this development. The first hypothesis was partly confirmed, as we found that fathers' and mothers' alcohol use exposure was associated with social AE (but not enhancement AE) over six months. The results remained the same when controlling for previous AE. This indicated that higher levels of exposure were associated with a change in social AE from one moment to the next. Together, this confirmed the hypothesis that adolescents associate their parent's drinking with positive social outcomes, which has been found in previous studies (Colder et al., 1997; Shen et al., 2001; Smit et al., 2018b; Ting et al., 2015). Moreover, when adolescents observe their parents drinking, they develop more positive social expectancies about the effects of alcohol over a shorter time span of six months, for example. These results are consistent with the preliminary conclusion of our previous study (Smit et al., 2019). One explanation for this development might be that parents tend to show mostly positive consequences as a result of their drinking (Goldstein et al., 2013; Jayne and Valentine, 2017), especially in social situations, such as family barbecues and birthday parties. As previous studies have already found that positive AE develop in late childhood and early adolescence (Cameron et al., 2003; Copeland et al., 2014; Smit et al., 2018b), adolescents' observations of parents' drinking behavior might be partially responsible for this, even in short term change. This suggests that parents remain important influencers of learning specific alcohol-related cognitions also in early adolescence (Ouellette et al., 1999). In terms of the development of alcohol use practices, these social AE might form the basis for social drinking motives. In previous work, social motives were in turn associated with moderate (Cho et al., 2019; Kuntsche et al., 2005) and high drinking levels, including heavy episodic drinking (Bradizza et al., 1999; Pabst et al., 2014; Van Damme et al., 2013; Van Tyne et al., 2012) in adolescence and beyond. In contrast to social AE,

<sup>1</sup> The results when adding recent alcohol use are available in supplementary Table 1.

<sup>2</sup> Age did not moderate the association between exposure and AE. For interpretation, we only reported gender effects, and the results are available upon request.

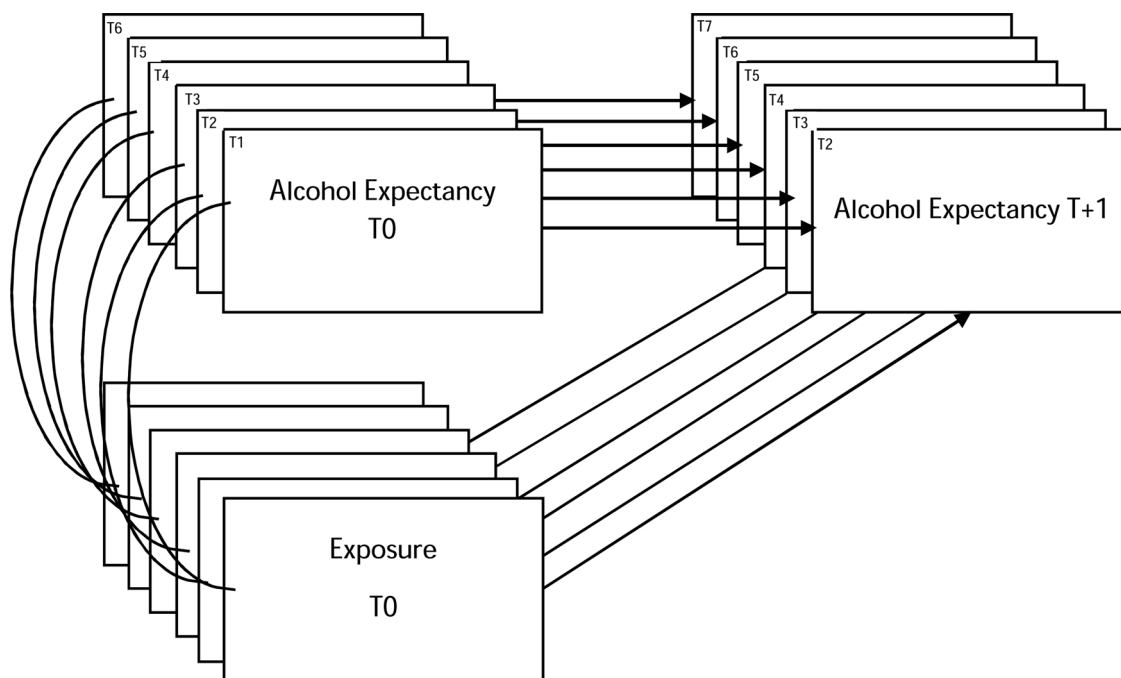


Fig. 1. Representation of the model evaluating the association between parental alcohol use exposure and adolescent AE six months later, while controlling for AE at the previous time point.

**Table 1**  
Levels of Alcohol Expectancies and Their Association With Time.

	min	max	M	SD	r <sup>a</sup>
Enhancement AE	0	4	2.59	.46	-.002
Social AE	0	4	1.71	.72	.135***
Coping AE	0	4	1.96	.69	.035*
Conformity AE	0	4	1.67	.56	.010

Note: <sup>a</sup> association between AE and time point [0–6]; \*p < .05, \*\*p < .01, \*\*\*p < .001.

**Table 2**  
Bivariate Associations Between Parental Alcohol Use Exposure and Adolescents, Cross-sectionally and Over Six Months.

	(1)	(2)	(3)	(4)	(5)	(6)
(1) Enhancement	<b>.311*</b>	.348*	.475*	.441*	.027	.067*
(2) Social	.165*	<b>.564*</b>	.505*	.476*	.187*	.165*
(3) Coping	.219*	.316*	<b>.499*</b>	.522*	.064*	.075*
(4) Conformity	.170*	.286*	.303*	<b>.404*</b>	.002	.048
(5) Exposure father	.036	.154*	.059*	.025	<b>.797*</b>	.553*
(6) Exposure mother	.019	.172*	.042	-.016	.454	<b>.843*</b>

Note. Correlations above the diagonal are cross-sectional, correlations on (in bold) and below the diagonal are longitudinal associations, i.e., T0→T1; \*p < .001.

exposure to parental drinking was not associated with enhancement AE. One explanation for this finding might be that enhancement AE were already at a higher level at T0 compared to the other AE dimensions. This may have caused a ceiling effect, suggesting that expectancies about the enhancing properties of alcohol already develop before the age of 10, i.e., in childhood. Early development of positive (and enhancing) AE has been shown among four to eight-year-olds (Kuntsche and Kuntsche, 2017; Smit et al., 2019), although future research could further investigate whether enhancement AE are more endorsed compared to social AE at a young age. Regarding the third aim, we focused on gender differences in the associations between parental alcohol use exposure and AE in adolescents over time. The results provided further evidence of one gender-specific association. Specifically, we found that fathers' exposure was associated with

enhancement AE for boys but not for girls. No other differences were found between boys and girls. In a previous study, we found that exposure to fathers' alcohol use mediated the association between fathers' reported quantity of drinking and enhancement AE in boys (Smit et al., 2019). The present study extends these findings by showing that exposure to fathers' alcohol use is related to the further development of enhancement AE over time. This is important when considering that positive reinforcement AE (i.e., social and enhancement) are associated with positive reinforcement motives (Kuntsche et al., 2005; Van Tyne et al., 2012), which are predictive of higher alcohol use in adolescence (Cho et al., 2019). In general, findings are mixed with some studies showing differences between fathers and mothers (Kuntsche and Kuntsche, 2018) and other studies indicating similar effects (Handley and Chassin, 2009; Mares et al., 2015; Voogt et al., 2017a, b). One possible explanation may be that fathers have a stronger influence on specific AE since they typically drink more compared to mothers (Holmila and Raitasalo, 2005; Nolen-Hoeksema, 2004) and therefore endorse more positive effects of alcohol (Jayne and Valentine, 2017). In addition, boys may identify more with their fathers, and therefore perceive fathers' drinking as associated with increasing positive emotions internally (e.g., fun), in other words enhancement AE.

4.1. Strengths and limitations

Strengths of the study included the use of longitudinal study design with six measurement waves conducted with each participant at six-month intervals. Moreover, we had an extremely low dropout rate (5%), resulting in a robust dataset with 4200+ available data points. As a result, we identified patterns of change in positive associations between parental alcohol use exposure and AE among 10-13-year olds over a course of three years. These patterns appeared consistent as they did not change when controlling for several covariates and when analyzing the models separately by gender. However, several limitations of this study should be acknowledged. First, our sample was native Dutch (about 98 %) from higher SES backgrounds, which does not allow generalizability of the results to other populations. Second, participation rates during recruitment were low for both schools and families (Voogt et al., 2017a, b; Smit et al., 2018a, b). Third, although the current study focused on AE dimensions based on the four broad motive dimensions underlying various drinking



**Table 3**  
Exposure To Father's and Mother's Alcohol Use as Predictors of Change in Alcohol Expectancies Six Months Later.

	Enhancement AE <sup>a</sup>	Social AE <sup>a</sup>	Coping AE <sup>a</sup>	Conformity AE <sup>a</sup>
<i>Model 1</i>				
Exposure father	.029 (.021)	.080 (.030)**	.048 (.030)	.041 (.024)
Exposure mother	-.003 (.022)	.129 (.032)***	.01 (.032)	-.045 (.027)
Time	.020 (.007)***	.083 (.008)***	.030 (.007)***	.035 (.007)***
<i>Model 2</i>				
Exposure father	.009 (.017)	.034 (.017)*	.021 (.018)	.017 (.016)
Exposure mother	.001 (.017)	.052 (.017)**	-.001 (.019)	-.031 (.018)
Previous AE	.309 (.024)***	.542 (.018)***	.497 (.017)***	.411 (.021)***
Time	.021 (.006)***	.046 (.006)***	.038 (.011)***	.034 (.006)***

Note. Effects are standardized Beta's (standard errors in brackets); <sup>a</sup> T0->T1; \*p < .05; \*\*p < .01; \*\*\*p < .001.

**Table 4**  
Multi-group Models of Gender in the Association Between Exposure To Father's and Mother's Alcohol Use and Change in Alcohol Expectancies.

	Enhancement AE <sup>a</sup>	Social AE <sup>a</sup>	Coping AE <sup>a</sup>	Conformity <sup>a</sup>
<i>Group: boys</i>				
Previous AE	.333 (.035)***	.554 (.023)***	.502 (.024)***	.423 (.028)***
Time	.024 (.019)	.075 (.016)***	.041 (.017)***	.058 (.017)*
Exposure father	.075 (.031)*	.052 (.024)*	.047 (.026)	.037 (.029)
Exposure mother	-.054 (.028)	.052 (.023)*	-.002 (.026)	-.033 (.032)
<i>Group: girls</i>				
Previous AE	.287 (.030)***	.513 (.024)***	.492 (.024)***	.379 (.027)***
Time	.072 (.019)***	.087 (.015)***	.038 (.014)**	.081 (.016)***
Exposure father	-.045 (.030)	.009 (.022)	.000 (.024)	-.009 (.025)
Exposure mother	.050 (.030)	.051 (.023)*	-.001 (.025)	-.018 (.026)

Note. Effects are standardized Beta's (standard errors in brackets); <sup>a</sup> T0->T1; \*p < .05; \*\*p < .01; \*\*\*p < .001.

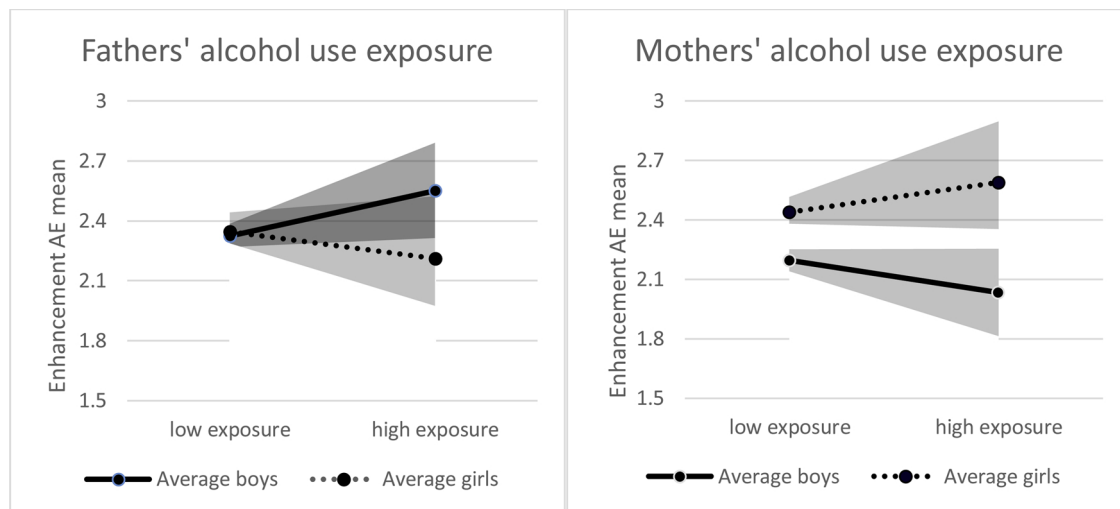


Fig. 2. Illustration of the interaction effect of adolescents' gender on the link between alcohol use exposure (low and high) and enhancement AE with 95 % confidence intervals (shaded area).

patterns (Cooper, 1994; Kuntsche et al., 2010), one limitation was that we did not account for negative AE (e.g., “alcohol use results in being sick”) or more specific AE (e.g., motor skills such as “alcohol makes you a better dancer”) that might emerge as a result of exposure to parental alcohol use. For instance, observing dancing parents may increase adolescents' motor enhancement AE, which are aspects that can be found in the original Alcohol Expectancy Questionnaire (AEQ, Brown et al., 1987). Although mixed conclusions were found for negative AE and its association with alcohol use (Smit et al., 2018b), specific AE might be associated with different patterns of drinking behavior, which makes this an interesting avenue for future research.

4.2. Future studies

Next to overcoming the limitations, several other avenues for future

research did emerge. The current study focused primarily on alcohol exposure in social situations (e.g., restaurants, dinner). These situations might be more likely associated with positive outcomes of alcohol (Jayne and Valentine, 2017); therefore, future studies should investigate whether different and more problematic forms of exposure (e.g., drunkenness, frequency of alcohol use, heavy alcohol use, and even alcohol dependence) are associated with more negative reinforcement AE. Another important topic to investigate in the future, is offspring's gender-specific perceptions of drinking behavior. We found a positive association between exposure and enhancement AE for boys, which was not the case for girls. Although this could be partly explained by heavier alcohol use by fathers, this does not fully explain why boys develop enhancement AE. Qualitative studies should unravel why this is the case by examining perceived gender roles (i.e., differences in alcohol use and perceived outcomes between fathers and mothers

(Hughes et al., 2016)) regarding parental drinking. Additionally, future studies should test whether the change in positive AE is actually associated with drinking behavior in later adolescence and adulthood (Campbell and Oei, 2010). This would provide more insight into cognitive factors that are potentially important in the intergenerational transmission of drinking behavior. Along these lines, future longitudinal research should focus on the mediational role of AE in the relationship between parental exposure and alcohol use in adolescence and (young) adulthood, thereby extending previous findings on general measures of parental alcohol use and older samples (Müller and Kuntsche, 2011; Van Damme et al., 2015).

#### 4.3. Practical implications

Like previous studies (Kuntsche and Kuntsche, 2018; Smit et al., 2019, 2018b; Voogt et al., 2017a), the current study provided additional evidence that parents influence the development of AE from early to middle adolescence, even within relatively short time spans. One way to address positive AE is through (brief) interventions, such as those focusing on AE challenges. However, these interventions have shown limited efficacy in individuals who have already started drinking (Wiers and Kummeling, 2004; Wood et al., 2007), and efficacy research among adolescents is lacking (Tanner-Smith and Lipsey, 2015). Based on current results, a promising way to prevent the development of positive AE in early adolescents is by minimizing parental alcohol use exposure. This is particularly true for social AE, which attribute social benefits to fathers' and mothers' alcohol use. These results suggest that parents have an effect on the development of AE in a relatively simple way: by minimizing exposure and not showing the consequences of alcohol use.

#### 4.4. Conclusion

The current study followed 10-to-13-year-old adolescents over a course of three years while measuring their exposure to parental alcohol use and their AE every six months. The results showed that positive AE (both positive reinforcing and negative reinforcing) increase significantly over time. Fathers' and mothers' alcohol use exposure was significantly associated with social AE even when controlling for previous levels of AE. The latter result indicates that exposure to parental alcohol use is associated with a change in AE over a course of six months. Some gender-specific results emerged, such as fathers' exposure was associated with enhancement AE of boys (and less so for girls). These results extend previous studies showing that modeling of alcohol-related cognitions occurs in short periods. Therefore, prevention should incorporate explicit guidelines for parents to highlight how offspring perceives their drinking behavior.

#### Contributors

All authors have contributed to (see below) and approved the final manuscript.

	KS	CV	RO	MK	EK
Conceptualizing/refining research ideas	x	x	x	x	x
Literature search	x				x
Creating research design	x	x	x	x	x
Instrument selection	x	x	x	x	x
Data collection	x	x			
Data analyses	x	x			x
Interpretation of data analyses	x	x	x	x	x
Drafting manuscripts	x				
Editing manuscript	x	x	x	x	x

Note: KS = Koen Smit, CV = Carmen Voogt, RO = Roy Otten, MK = Marloes Kleinjan, EK = Emmanuel Kuntsche.

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#### Declaration of Competing Interest

No conflict declared.

#### Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.drugalcdep.2020.107938>.

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