Popularity and Alcohol Use and the Effects of Peers and Pubertal Development

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Abstract

Early drinking in adolescence is associated with later risks, such as problematic use in young adulthood. Research shows that being popular is a possible predictor of alcohol use among adolescents. In addition, peers and an early pubertal development might influence the relation between popularity and alcohol use. However, studies about these moderating factors are limited. In this paper it is aimed to investigate the longitudinal relation between popularity and alcohol use among adolescents and to investigate the effects of having alcohol drinking peers and an early pubertal development within this relationship. The used data is from the first three waves of the Tracking Adolescents' Individual Lives Survey (TRAILS) and contained 2229 preadolescents in wave 1 (M_{age} = 11.1, SD = 0.6). Results of the regression analysis showed that whilst popularity predicted an increase in alcohol use of adolescents, this relationship was not stronger for those with drinking peers early pubertal development. It is found that adolescents with more alcohol drinking peers were more likely to drink alcohol themselves. The findings implicate that is important that adolescents find other ways than drinking alcohol to increase or maintain their status.

Keywords: alcohol use; popularity; peers; pubertal development; adolescents

Samenvatting

Op jonge leeftijd alcohol drinken gaat gepaard met verschillende risico's, zoals problematisch alcoholgebruik later. Onderzoek laat zien dat populariteit een mogelijke voorspeller is voor alcoholgebruik in adolescentie. Daarnaast is het mogelijk dat het alcoholgebruik van vrienden en een vroege puberteitsontwikkeling deze relatie beïnvloedt. Echter, er zijn weinig studies die zich richten op deze moderatoren. Deze studie is gericht op het onderzoeken van de longitudinale relatie tussen populariteit en alcoholgebruik onder adolescenten en de effecten van alcohol drinkende vrienden en een vroege puberteitsontwikkeling op deze relatie. De eerste drie meetmomenten van de Tracking Adolescents' Individual Lives Survey (TRAILS) is gebruikt en bevatte 2229 preadolescenten op het eerste meetmoment *($M_{leeftijd}$* = 11.1, *SD* = 0.6). Uit de regressieanalyse is gekomen dat populariteit een toename in het alcoholgebruik van adolescenten voorspelde, maar deze relatie was niet sterker voor hen met alcohol drinkende vrienden en een vroege puberteitsontwikkeling. Wel is er uit de analyse gebleken dat adolescenten met meer alcohol drinkende vrienden meer kans hadden om zelf alcohol te gebruiken. De resultaten impliceren dat het belangrijk is om voor adolescenten andere manieren te vinden dan alcohol drinken om hun status te versterken of te behouden.

Keywords: populariteit; alcohol gebruik; vrienden; puberteitsontwikkeling; adolescenten

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1. Introduction

In Europe, approximately 25% of 15-year-old adolescents start drinking at the age of 13 (Inchley et al., 2018). At the age around 15 and 16, more than 80% have tried alcohol at least once in their live (Kraus & Nociar, 2016). Unfortunately, this early alcohol use is associated with negative short-term consequences (e.g., risky sexual behavior, traffic accidents) and long-term consequences (e.g., mental health disorders; Boden & Fergusson, 2011). Furthermore, early alcohol use can increase the risk of later problematic alcohol use (Boden & Fergusson, 2011; Grant et al., 2005). Especially adolescents are thought to be more vulnerable for the negative consequences of alcohol use, for instance, because of their underdeveloped brain (Casey & Jones, 2010; Ewing et al., 2014). This vulnerability indicates the importance of investigating the problem of alcohol use in adolescence.

Several reasons for alcohol use in adolescence are discussed in the literature. One of these reasons for adolescents to drink alcohol is to achieve a popular status (Prinstein et al., 2011). Adolescents may drink alcohol to fit in and avoid rejection, often by copying the drinking behavior of peers (Gommans et al., 2017; Malamut et al., 2020; Montgomery et al., 2020). Furthermore, adolescents might also drink alcohol because of the developmental changes typical for the adolescent period (Romer, 2010), such as an increased sensation seeking tendency (Chambers et al., 2003). The relationship between popularity and alcohol use is studied in previous research, however, how factors as peers' alcohol use and early pubertal development interact with popularity is less well understood. Therefore, this paper aims to investigate the longitudinal relation between popularity and alcohol use and the interacting effects of having alcohol drinking peers and early pubertal development within this relationship.

1.1 Popularity

Several studies have investigated the relationship between popularity and alcohol use in adolescence. Cross-sectionally it is found that popularity is positively associated with alcohol use (Tucker et al., 2011). This association is also longitudinally confirmed; peer nominated popularity predicts an increase in alcohol use over time (Guyll et al., 2014). Peer-nominated popularity is a method to measure social status by asking peers to nominate other classmates with respect to certain behaviors (Del Vecchio, 2011). It is even suggested that the longitudinal relation between peer-nominated popularity and alcohol use is bidirectional (Malamut et al., 2020). However, the direction of popularity predicting more alcohol use is stronger than alcohol use predicting more popularity. A limitation is that no other potential moderators other than gender are examined in that longitudinal study (Malamut et al. 2020).

Another weakness in the literature is that not all previous studies used only peer-nominations. Some studies used for instance self-reported popularity (e.g., Dumas et al., 2019), which is a less reliable measure for popularity.

The maturity gap may provide an explanation for why adolescents start to drink at an early age (Moffitt, 1993). From a biological perspective, adolescents mature earlier than from a social perspective. Therefore, a developmental gap arises in which adolescents want to engage in adult-like behaviors, but do not have the privileges to do so. (Moffitt, 1993). Because adult-like risk behaviors reflect mature behaviors, adolescents may attach status to these behaviors. Consequently, engaging in such behaviors could increase adolescents' status (Dumas et al., 2019). Thus, popular adolescents may desire to retain or heighten their status by demonstrating adult-behaviors, such as drinking alcohol (Guyll et al., 2014).

Another explanation for the positive association between popularity and alcohol use can be the popularity-socialization hypothesis (Allen et al., 2005). It is suggested that popular individuals are more vulnerable to be socialized into drinking behaviors. Popular adolescents are more skilled and attuned to meet the norms of the peer group. Therefore, they are more integrated within the peer group and their norms, and more likely to follow these norms than non-popular adolescents (Dumas et al., 2019; Teunissen et al., 2012), as they do not want to lose their high status. Consequently, in a context in which alcohol drinking is perceived as important, the attractive value of drinking alcohol may especially influence the drinking behavior of popular adolescents (Veenstra et al., 2018), as they are more integrated within this context. Earlier research found indeed that if the group norm is supporting alcohol use, popular adolescents were more likely to drink (Allen et al., 2005; Rambaran et al., 2013; Teunissen et al., 2012). To further examine the exact nature of the relation between popularity and alcohol use, this paper aims to confirm the following question: *Does popularity predict more drinking behavior in adolescence?*

1.2 Drinking Behavior of Peers

In addition to popularity, peer influences on alcohol use are often examined as adolescents are more susceptible to peer influences on their substance use than adults (Allen et al., 2005; Helms et al., 2014; Henneberger et al., 2020). Especially the alcohol use of popular adolescents seems to be influenced by alcohol favoring peers. Alcohol use is often associated with a high social status (e.g., Allen et al., 2005; Prinstein et al., 2011). This means that alcohol drinking behavior is reputationally salient (Laninga-Wijnen et al., 2017). If popular adolescents have a peer group where drinking alcohol is common and accepted, it is likely that they engage in drinking behavior than when they have a peer group which is not

accepting alcohol use, as this drinking behavior is a way to maintain their status (Balsa et al., 2011). Thus, conforming to the norms of alcohol drinking peers may lead to maintaining status, which is important for popular adolescents.

In a systematic review, it was indeed found that individuals will copy the drinking behavior of peers if this behavior is valued by the group (Henneberger et al., 2020). Similarly, it was found that thinking that other adolescents drink alcohol is a predictor of own alcohol use (Helm et al., 2014). Although a direct link between the influence of peers on alcohol use is examined often (e.g., Helms et al., 2014; Henneberger et al., 2020), the association between popularity and alcohol use in the context where alcohol drinking is normative has been less well studied. Therefore, the following question will be examined: *Is the relationship between popularity and alcohol use stronger for adolescents who have friends who drink?*

1.3 Early Pubertal Development

Aside from the social influences, research also suggest a biological explanation for alcohol use during adolescence. Puberty is associated with an increase in hormone production, dopamine levels and sensation seeking behavior (Chambers et al., 2003). These changes are associated with behavioral maturation (Sisk & Foster, 2004). Adolescents experience an increase in interest in adult-like activities (Veenstra et al., 2018) and spending time with, and valuing the opinion of peers more (Romer, 2010).

It is expected that popularity might lead to more alcohol use, particularly among early maturing adolescents. As earlier mentioned, popular adolescents want to maintain their status and will choose drinking behaviors to reinforce their status. For early maturing adolescents it will be more likely than later maturing adolescents to choose alcohol, as they have the stronger need to protect their social status within this group and a stronger sensation seeking tendency. It is found that adolescents with a lower educational level experienced an earlier maturation and therefore engaged in more adult-like behaviors and spent more time with friends, because they strive for an adult status at an earlier age (Vermeulen-Smit et al., 2012).

The association between early pubertal development and alcohol use has been examined before. An early pubertal timing predicted substance use in adolescence (Copeland et al., 2010) . However, this association may only be the case for adolescent girls and not boys. In a longitudinal study it was found that pubertal development was associated with an increase of substance use among girls. However, they did not find a positive association between pubertal timing and substance use among boys (Marceau & Jackson, 2017). This

association was neither found in another longitudinal study. Boys were neither more nor less likely to use alcohol (Taga et al., 2006).

As far as known, studies about the interaction effect of early pubertal maturation with popularity on alcohol use are limited. Therefore, the following question will be examined: *Is the relation between popularity and alcohol use stronger for adolescents who mature early?*

2. Present Study

The aim of the current study is to examine whether popularity predicts an increase in alcohol use among adolescents and whether this relation is stronger for popular adolescents with alcohol drinking peers and an early pubertal development. Corresponding with the conceptual model (see figure 1), this paper contains several hypotheses.

A fair amount of research has been conducted about popularity and alcohol use in adolescence and it seems that popular adolescents are more likely to drink more alcohol due to their desire for a high social status (Dumas et al., 2019; Prinstein et al., 2011). This leads to the following hypothesis: *H1: Popularity predicts an increase in the alcohol use of adolescents.*

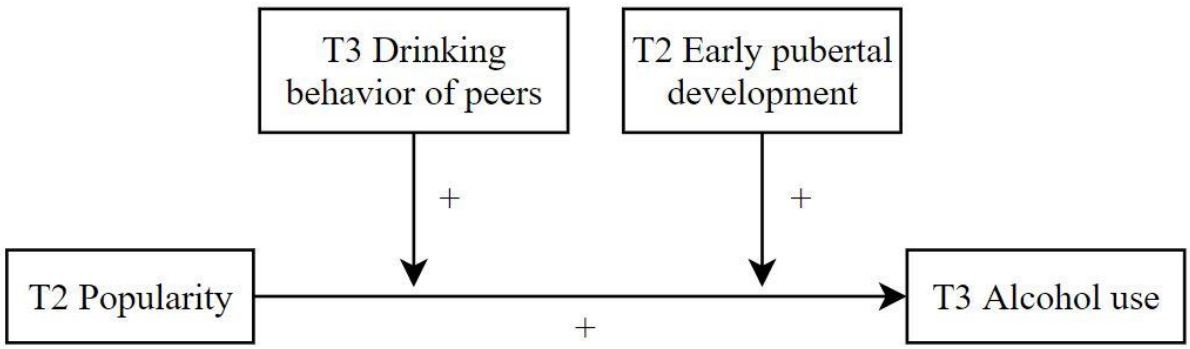
The association between popularity and alcohol use may be particularly strong in the context where alcohol drinking is normative. Thus, when a popular individual has friends who drink, it is more likely that this person starts drinking as well, to remain a popular status. Hence, the following hypothesis: *H2: The relationship between popularity and alcohol use is stronger for adolescents who have friends who drink alcohol.*

Lastly, the association between popularity and alcohol may be stronger when adolescents have an early pubertal development, as they may have an increased tendency to engage in adult-like behaviors to maintain their status (Vermeulen-Smit et al., 2012). This leads to the following hypothesis: *H3: The relationship between popularity and alcohol use is stronger for adolescents who mature early.*

Gender and the educational level of the participants will be considered as control variables, as earlier studies suggest that there are gender differences in the outcome of alcohol use (e.g., Copeland et al., 2010; Marceau & Jackson, 2017; Taga et al., 2006) and educational level (De Looze et al., 2017; Vermeulen-Smit et al., 2012).

Figure 1

Conceptual model of the relation between popularity and alcohol use in adolescence



3. Method

3.1 Participants

The data used in this study is part of the Tracking Adolescents' Individual Lives Survey (TRAILS). The longitudinal study started in 2001/2002 and follows Dutch preadolescents (age 10-12) every 3 years. This particular study includes information from wave 1, 2 and 3. In total, 2229 preadolescents enrolled in wave 1 (M_{age} = 11.1, *SD* = 0.6, 51% female). Wave 2 included 2149 participants (96%; M_{age} = 13.6 , *SD* = 0.5, 51% female). The third wave included 1816 participants (81%; M_{age} = 16.3, *SD* = 0.7, 52% female). For a more detailed description see De Winter et al. (2005).

An attrition analysis to evaluate the impact of missing data was conducted by comparing adolescents from wave 3 with adolescents who dropped out in wave 3. Results indicated no significant differences in alcohol use or physical development. However, there were significant differences in age ($t(2148) = -3.71$, $p < .01$); dropouts were slightly older.

3.2 Design and Procedure

In total, 122 schools agreed to participate in the study. Parents and children were informed about TRAILS and if parents agreed to participate, an interview was scheduled. The TRAILS study was approved by the Central Committee on Research Involving Human subjects (CCMO) on ethical standards.

In wave 1, trained interviewers questioned one of the parents or guardians at their homes and parents were asked to fill out a self-report questionnaire. Children filled out a questionnaire at school, under supervision of a TRAILS assistant. For more information about the procedure and design see De Winter et al. (2005).

At the second wave a peer nomination procedure was conducted, resulting in a subsample of peer nominations from TRAILS participants and classmates (*N* =1007). Peer

nominations were assessed in classrooms with a minimal of 10 TRAILS participants. Additional information about the peer nominations procedure can be found in Dijkstra et al. (2008).

3.3 Operationalization

3.3.1 Alcohol use (T2, T3)

Alcohol use is measured with four items assessing drinking behavior that combined assessing the frequency and quantity of use. Frequency of alcohol use during the week is measured with a Likert scale of 5 answers *(0 = I never drink during the week, 4 = 4 days)*. Frequency during the weekend is measured with a 4-point Likert scale. Quantity of alcohol use during the week is measured with a 9-point Likert *scale (0 = I never drink during the week, 8 = 11 glasses a day or more)*. Quantity during the weekend is measured with an 11-point Likert scale. The items are then combined by multiplying the frequency with the quantity during the week and weekend. Adding these two together leads to a sum score of an average number of alcohol beverages during a week (Peeters et al., 2019). A higher score indicates more alcohol use.

3.3.2 Popularity (T2)

Popularity is measured at T2. Respondents could nominate classmates who they perceive as popular within their classroom. Then, the nominations received for being popular were divided by the total number of scores that could be received and were transformed into z-scores. With this calculation, differences in class-size are considered. A score of 0 is the average score of popularity, a higher score indicates being more popular.

3.3.3 Alcohol use peers (T3)

If adolescents have peers who use alcohol is measured with the item ‘How many of your friends drink alcohol at least once a week?’, with a Likert scale of 5 answers *(0 = no one, 4 = all of them)* at T3. A high score indicates having many alcohol drinking friends.

3.3.4 Early Pubertal Development (T2)

Early pubertal development is measured by the Physical Development Scale 8 (Petersen et al., 1988), on a 4-point Likert scale. An example of an item is: ‘How is it going with your growth in length (so-called growth-spurt)?’ *(0 = has not begun, 3 = the process is already behind me)*. The scale included 3 items for boys and girls about growth-spurt, development of body hair, and changes in skin (e.g., having pimples), and 2 for boys and girls separately. For boys, these items regarded changes in voice and development of facial hair ($\alpha = .75$), and for girls, development of breasts and menstruation ($\alpha = .71$). Higher scores indicate an early pubertal development.

3.4 Analysis

For the data-analysis, IBM SPSS Statistics 26 was used. First, descriptive statistics and Pearson correlations were analyzed. To test the main effect of popularity and the interaction effects, a hierarchical regression analysis was conducted. Whether popularity predicts alcohol use at T3 was examined by testing the direct effect of popularity at T2 on alcohol use at T3, controlled for alcohol use at T2. To examine whether this relationship is different depending on pubertal development, the interaction effect between popularity and pubertal development was tested. To examine whether this relationship is different depending on having alcohol using peers, the interaction effect between popularity and alcohol use of peers was tested. The interaction variables were first centered by subtracting the mean of the scores and the direct effects of these variables were checked. Furthermore, all analyses were controlled for educational level, sex, and alcohol at T2, and missings were deleted listwise.

Assumptions were checked, and alcohol use (at T2 and T3) and popularity were right-skewed and contained many outliers, however, the data were well scattered. Outliers were detected with the standardized residuals and Mahalanobis distance. One value of alcohol use at T3 was recoded as a missing value due to a systematic response tendency. There were influential cases with high values on leverage. The residuals were not fully normally distributed, and the data were heteroscedastic. Furthermore, the assumption of linearity between the variables and independent variable was violated, however, there was no multicollinearity. When interpreting the results, this should be considered.

4. Results

4.1 Descriptive statistics and correlations

The first column of table 1 presents the descriptive statistics of the variables. 44.4% of the participants at T2 followed the educational track of VMBO or lower, 18.9% was in a heterogenic class (VMBO/HAVO/VWO), and 36.7% followed the educational track of HAVO or higher (M = 4.04, SD = 1.86). A paired samples t test was used to compare the alcohol use at T2 (M = 1.63, SD = 4.54) with the alcohol use at T3 (M = 6.79, SD = 9.22). Participants drank significantly more alcohol at T3 than at T2 ($t(1579) = -23.16$, $p < .01$, 95% CI [-5.75, -4.85]).

Table 1 also presents the bivariate correlations between the variables. Alcohol use at T2 ($r = .34$, $p < .01$), sex ($r = .17$, $p < .01$), popularity ($r = .13$, $p < .01$), and alcohol use of peers ($r = .41$, $p < .01$) were significantly positively associated with alcohol use at T3; participants who drank more alcohol at T2, who were male, who were popular, and had more alcohol using peers, were more likely to drink alcohol at T3. Educational level was

significantly negatively associated with alcohol use at T3 (r = -.20, p < .01), suggesting that participants with a lower educational level were more likely to drink alcohol at T3.

Most of these results also applied to alcohol use at T2. In addition, pubertal development seemed to have a significant positive correlation with alcohol use at T2 (r = .20, p < .01); more developed participants were more likely to drink alcohol at T2. Pubertal development was also significantly negatively associated with sex (r = -.46, p < .01), suggesting that girls were earlier developed than boys. Furthermore, alcohol use of peers was significantly positively associated with popularity (r = .13, p < .01) and pubertal development (r = .07, p < .05), indicating that adolescents with alcohol drinking friends were more likely to be popular and have an earlier development. Educational level was significantly negatively associated (r = -.15, p < .01), indicating that participants with more alcohol drinking peers were more likely to have a lower educational level.

Table 1

Descriptive statistics of variables and Pearson correlations between variables

	M (SD)	1.	2.	3.	4.	5.	6.
1. Alcohol use (T3)	6.79 (9.22)						
2. Alcohol use (T2)	1.63 (4.54)	.34**					
3. Male (T1)	0.49 (0.50)	.17**	.01				
4. Educational level (T2)	4.04 (1.86)	-.20**	-.17**	.03			
5. Popularity (T2)	0.01 (1.02)	.13**	.15**	-.01	-.05		
6. Alcohol use peers (T3)	2.27 (1.13)	.41**	.19**	.07	-.15**	.13**	
7. Pubertal development (T2)	1.36 (0.65)	.03	.20**	-.46**	-.07	.02	.07*

Note. Effect is significant at **p < .01 and *p < .05 (two-tailed).

4.2 Hierarchical regression analysis for relationship between popularity and alcohol use

The first model tested whether the control variables were significant predictors of alcohol use at T3 (see table 2). Sex (B = 2.86, t = 5.10, p < .01, 95% CI [1.76, 3.97]) and alcohol use at T2 (B = 0.88, t = 9.37, p < .01, 95% CI [0.69, 1.06]) were significant positive predictors of alcohol use at T3; higher scores on alcohol use at T2 or being a boy predicted an increase in alcohol use at T3. Educational level had a significant negative effect on alcohol use at T3; lower scores on educational level at T2 predicted an increase in alcohol use at T3

(B = -0.69, t = -4.39, p < .01, 95% CI [-1.00, -0.38]). The control variables explained 16.4 % of the variance in alcohol use at T3 (R^2 = .16, F(3, 768) = 50.09, p < .01).

To test whether popularity was a significant predictor of alcohol use at T3, popularity was added in model 2 (see table 2), controlled for sex, educational level, and alcohol use at T2. The analysis confirmed that popularity at T2 was a significantly predictor of alcohol use at T3 (B = 0.60, t = 2.20, p < .05, 95% CI [0.07, 1.14]); higher scores on popularity at T2 predicted an increase in alcohol use at T3. This second model explained 16.9% of the variance in alcohol use at T3 (R^2 = .17, F(4, 767) = 38.97, p < .01).

4.2.1 Interaction effects of pubertal development alcohol use of peers

Before testing the interaction effects, the third model included the direct effects of alcohol use of peers and pubertal development on alcohol use at T3 (see table 2). Only alcohol use of peers was significantly positively associated alcohol use at T3 (B = 2.56, t = 10.49, p < .01, 95% CI [2.08, 3.04]); adolescents with high scores on having alcohol using peers were more likely to have higher scores on alcohol use. Pubertal development did not have a significant effect on alcohol use. The third model explained 27.5% of the variance in alcohol use at T3 (R^2 = .28, F(6, 765) = 48.28, p < .01).

At last, it was tested whether the relationship between popularity and alcohol use differed depending on having an early pubertal development or having alcohol using peers (see table 2). Both interaction variables were added separately. There were no significant interaction effects of pubertal development or having alcohol using friends with popularity on later alcohol use.

Table 2

Hierarchical regression analysis of popularity, pubertal development, drinking peers and their interaction on alcohol use at T3

	Model 1	Model 2	Model 3	Model 4
	Alcohol use (T3) *B* (SE)	Alcohol use (T3) *B* (SE)	Alcohol use (T3) *B* (SE)	Alcohol use (T3) *B* (SE)
Alcohol use (T2)	0.88 (0.09)**	0.85 (0.09)**	0.70 (0.09)**	0.71 (0.09)**
Male (T1)	2.86 (0.56)**	2.87 (0.56)**	2.59 (0.60)**	2.60 (0.60)**
Educational level (T2)	-0.69 (0.16)**	-0.68 (0.16)**	-0.48 (0.15)**	-0.47 (0.15)**
Popularity (T2)		0.60 (0.27)*	0.32 (0.26)	0.43 (0.27)
Alcohol use peers (T3)			2.56 (0.24)**	2.51 (0.25)**
Pubertal development (T2)			0.21 (0.47)	0.60 (0.50)
Popularity x alcohol use peers				-0.23 (0.40)
Popularity x pubertal development				-0.37 (0.42)
R2	.16**	.17**	.28**	.28**

Note. Effect is significant at **$p < .01$ and *$p < .05$ (two-tailed).

5. Discussion

The aim of this study was to investigate the longitudinal relationship between popularity and alcohol use among adolescents. Existing knowledge on the relationship between popularity and alcohol use was extended by considering the interacting effects of alcohol drinking peers and early pubertal development within the relationship between popularity and alcohol use. Results revealed that popularity at T2 had a significant positive effect on alcohol use at T3. Even after controlling for gender and educational level, popularity predicted an increase in alcohol use over time. However, the interaction effects between popularity and puberty, and popularity and drinking peers on alcohol use, were not significant. This implies that neither having alcohol drinking peers nor an early maturation amplifies the effect of popularity on alcohol use.

Consistent with previous research (e.g., Dumas et al., 2019; Guyll et al., 2014; Malamut et al., 2020), being popular is a risk factor for alcohol use in adolescence. Results of this study showed that peer-nominated popularity predicted more alcohol use in adolescence 2 years later, which is in line with the first hypothesis. The desire for adolescents to have and to remain having a high social status could explain why these adolescents more than their non-popular peers engage in drinking behavior. A way to achieve status is by participating in adult-like behaviors (Moffitt, 1993), such as drinking alcohol. Thus, popular adolescents might drink alcohol to enhance their status (Guyll et al., 2014). In addition, because of their popularity they are more socially skilled to meet the norms of the peer group and have more ties to the group and are therefore well socialized into their peer group. Because they are strongly connected to the group, they are more susceptible for the influences of their peer group and are more aware of the norms of this group (Dumas et al., 2019). Consequently, in a context in which alcohol drinking is perceived as positive, popular adolescents may more likely drink alcohol than unpopular adolescents.

In line with previous research (e.g., Helms et al., 2014; Henneberger et al., 2020), it is found that adolescents who have more alcohol drinking friends were more likely to use alcohol themselves. However, the effect seemed to exceed the significant effect of popularity. This can be explained by overlap between the variables. Both variables concern the social network of the adolescents. In addition, popularity is measured a wave before alcohol use, while having alcohol drinking peers is measured concurrently with alcohol use. Thus, the association between popularity and alcohol use is prospective while the relationship between drinking peers and alcohol is cross-sectional. Therefore, the association between having alcohol drinking peers might be stronger.

It was expected that popular adolescents who have alcohol drinking peers would even more likely drink alcohol, because they are surrounded by a peer group in which alcohol drinking is accepted and may contribute to maintaining a popular status (Balsa et al., 2011; Henneberger et al., 2020). However, this hypothesis was not confirmed by the results of the current study. A first explanation might be that alcohol use of peers is measured by self-report. Research indicates that many youth overestimate the alcohol use of their peers (Giese et al., 2019). Second, due to using existing data, the current study was not able to differentiate between the number of alcohol using peers and peer norms. It might be more important to know how alcohol is valued in a peer group compared with knowing how many peers drink. Earlier research showed when popular adolescents perceived the peer group norm as supporting alcohol use, they were more likely to drink (Allen et al., 2005; Rambaran et al.,

2013; Teunissen et al., 2012). Thus, to investigate the relation further, future studies should focus on investigating how peer norms interact with the relation between popularity and adolescents' alcohol use.

The last hypothesis which stated that the relationship between popularity and alcohol use was stronger for adolescents who mature early, was rejected. Previous research suggested a direct effect of pubertal development on alcohol use (e.g., Copeland; Marceau & Jackson, 2017), though results of the current study did not replicate these findings, nor showed support for an interaction effect of early maturation and popularity. In this study it was assumed that a moderating role of puberty and associated changes in sensation seeking was a factor underlying an increase adult-like behaviors, such as alcohol use (Chambers et al., 2003; Veenstra et al., 2018). The measure used in this study, however, emphasized the physical development characteristics of an early pubertal maturation rather than the needs and behavioral tendencies earlier matured adolescents might have. Previous studies suggested that sensation-seeking could be more strongly related to substance use (Kong et al., 2013). Anyhow, the rise in sensation seeking during puberty is associated with bodily changes (Forbes & Dahl, 2010) and this finding suggest that there could be an association between physical development and drinking behavior. Future studies should investigate this relationship between pubertal development, popularity and alcohol use further and possibly include sensation seeking tendencies as well.

An important note is that the control variables of gender and educational level were significant during all models. Thus, these are important factors in predicting alcohol use over time. The results showed that male adolescents and adolescents with a lower educational level are more likely to drink alcohol, which is in line with previous studies (e.g., De Looze et al., 2017; Nolen-Hoeksema, 2004; Webb et al., 2002).

There are some strengths of the current study, as the study is based on a large sample and longitudinal data. The longitudinal design allowed investigation of relationships over time, creating the possibility to establish the direction of the relation between popularity and alcohol use. Furthermore, by using peer-nominations, the results are less biased compared with self-reported popularity. By using peer-nomination, the results reflect the opinion of multiple informants and may therefore be perceived as more valid (Phillips & Cornell, 2012). Despite these strengths, there are several limitations that should be mentioned. First, the constructs of popularity and having alcohol drinking peers were measured differently. While popularity was measure with peer-nominations, the alcohol use of peers is measured with self-report. This can cause discrepancies in the data, as self-reported data can be

overestimated (Giese et al., 2019). Second, although the sample was large, because of the peer-nominations not all adolescents from the original study and data from adolescents outside the study, who did participate in the nominations, were included. In addition, the data is relatively old and the drinking laws in the Netherlands have been changed. The legal age of drinking alcohol is increased from 16 to 18 years old. Trends show a decrease in alcohol use from 1999 to 2019 among adolescents (Volksgezondheid en zorg, 2020), which means that the participants of this study probably drank more alcohol than adolescents nowadays. Furthermore, the data is collected only in the North of the Netherlands. These limitations can result in difficulties to generalize results to other adolescent samples.

To conclude, it is demonstrated that popularity is associated with an increase in alcohol use three years later. In addition, having many peers who drink alcohol is also associated with drinking more alcohol. Popular adolescents perhaps try to remain their popular status and by doing so they engage in adult-like behaviors. Because of the negative consequences of alcohol drinking at an early age, it is important that adolescents find other ways to increase or maintain their status. Therefore, it is important that the environment of the adolescents provides other activities, such as sports, as a distraction from alcohol use, and that interventions are not focused on the individual behavior. A practical example of this can be seen in the Icelandic Prevention Model (Sigfúsdóttir et al., 2009). This model aims to prevent substance use among youth by targeting not only individual behaviors, but also family, peers, school, and community level behaviors. The current study provides further support that interventions should not only focus on the individual, but also include the social context. Another practical example is the ASSIST intervention (Campbell et al., 2008). In this intervention they train the peer-nominated popular students to change the smoking norms in classrooms by having informal contact with their peers to encourage them not to smoke. This could also be promising for alcohol use, as the current study shows the importance of peers and popularity on alcohol use in adolescence.

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