



# Indirect effects of theory of mind on alcohol use and problems in underage drinkers: The role of peer pressure to drink

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## ABSTRACT

**Objective:** Prior studies demonstrate a link between socio-cognitive deficits and alcohol problems in adolescents and young adults. Researchers have proposed that young people with such deficits may misperceive and over-value peers' attitudes about drinking and consider drinking a way to be accepted by their peer group. We test this hypothesis by investigating whether theory of mind (ToM) deficits in underage (18–20-year-old) drinkers are associated with binge drinking and alcohol problems, and whether these ToM deficits have an indirect effect on alcohol outcomes through perceived peer pressure to drink (i.e., high conformity motives and low perceived ability to refuse alcohol during social pressure).

**Method:** Participants ( $N = 472$ ; 91 % female; 71 % White;  $M_{age} = 19.28 \pm 0.77$ ) were recruited from TurkPrime and completed measures assessing ToM, conformity motives, self-efficacy to resist peer pressure to drink, alcohol problems, and binge drinking. Bivariate correlations were run to examine associations between study variables. Indirect effect models were run in SPSS, using the PROCESS add-on, to assess the indirect effects of ToM on alcohol outcomes through conformity motives and self-efficacy to refuse peer pressure to drink.

**Results:** ToM had indirect effects on binge drinking and alcohol problems through conformity motives (but not self-efficacy to resist peer pressure to drink). Lower ToM was associated with higher conformity motives, which were then associated with more frequent binge drinking and greater alcohol problems.

**Conclusions:** These findings highlight the role of social cognition in young adult alcohol misuse and suggest more work is needed to understand the potential influence of peer pressure in this association.

## 1. Introduction

Adolescence and young adulthood are critical periods for the initiation and escalation of alcohol use (Chen et al., 2004; Chung et al., 2018; Patrick et al., 2013; Patrick & Schulenberg, 2014), with about 12 % of adolescents and 28 % of young adults reporting past two-week binge drinking (Miech et al., 2022). Compared to other age groups, adolescents and young adults experience more negative consequences from drinking, such as unintentional injuries, alcohol poisoning, and suicide (Courtney & Polich, 2009; Hingson & White, 2014). Thus, identifying young people at increased risk for alcohol misuse and problems remains a research priority.

Alcohol is most often consumed in social contexts such as bars, parties, and social gatherings (Fairbairn & Sayette, 2014; McCabe et al., 2014), and this is particularly true for young people (Creswell, 2021;

Skrzynski & Creswell, 2020). As such, research aimed at understanding why young people drink, and why some develop alcohol problems, has often focused on social factors as they are central to typical drinking experiences. For instance, research shows that alcohol consumption plays a key role in social identity exploration in young people (Lindgren et al., 2014), and expectancies and motives of social facilitation from drinking are strong predictors of alcohol use and problems (Cooper et al., 2016; Creswell et al., 2020; Patrick et al., 2011; Ridout et al., 2012). The importance of social factors in understanding alcohol use is also apparent from research demonstrating robust effects of peer influence, social norms, and social networks on alcohol consumption (Borsari & Carey, 2001; Bot et al., 2005; Maxwell, 2002; Urberg et al., 2003), as well as effects of alcohol consumption on bonding and social facilitation (Creswell et al., 2012; Sayette et al., 2012). Therefore, identifying relevant social factors in the etiology of alcohol use problems can help

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identify individuals at risk for developing alcohol problems and can inform prevention strategies against risky drinking behavior (e.g., Creswell, 2021; Hamilton et al., 2021; Sher et al., 2005).

Recent work highlights the importance of socio-cognitive abilities, such as theory of mind (ToM) and empathy (Bulgarelli & Molina, 2016), in predicting alcohol use and problems among young people (Kumar et al., 2022a; 2022b; Lannoy et al., 2020; Winters et al., 2021). Theory of mind (ToM) is typically defined as the ability to recognize and attribute mental states (e.g., intentions, desires, beliefs, emotions) to oneself and others (Frith & Frith, 2005), and is often measured using the Reading the Mind in the Eyes Task (RMET; Baron-Cohen et al., 2001), which assesses the ability to infer the mental states of others based on eye region cues. ToM is crucial for successful everyday social interactions (Gunther Moor et al., 2011), as it helps people judge, analyze, and infer other's behaviors (Apperly & Butterfill, 2009). Notably, studies have found negative associations between ToM and alcohol use and problems (Lyvers et al., 2018; 2019). For instance, Lannoy and colleagues (2020) found that lower affective ToM using the RMET was associated with significantly more frequent binge drinking than higher affective ToM in adolescents. Similarly, another study found an association between lower ToM on the RMET and AUDIT risky drinking scores in a sample of university and community individuals (Lyvers et al., 2019). Indeed, a recent meta-analysis found a small but reliable link between lower ToM and alcohol problems in adolescents and young adults across the six studies assessing this association (Kumar et al., 2022b).

Despite a growing number of studies documenting associations between ToM (and other socio-cognitive) deficits and alcohol misuse and problems, potential mechanisms underlying these links are not yet well understood. Several explanations have been put forth in the literature, many of which center around drinking in social situations. For instance, researchers have proposed that individuals with lower socio-cognitive abilities may be prone to heavier alcohol use because they are more likely to use alcohol as a coping mechanism in social situations (Kuntsche et al., 2006; Lyvers et al., 2019), because they may be insensitive to social cues to stop drinking (Massey et al., 2018), and/or that they may misperceive and over-value peers' attitudes and norms about drinking and consider drinking a way to be accepted by their peer group (Cousijn et al., 2018; Laghi et al., 2019). This latter mechanism is particularly compelling, given research suggesting that adolescents' and young adults' perceptions of their peers' behavior are strong predictors of their own health behaviors (Monaci et al., 2013; Prinstein & Wang, 2005), and that individuals with lower socio-cognitive abilities may be more susceptible to peer pressure (Monaci et al., 2013; Nguyen et al., 2011; Trinidad et al., 2004). Taken together, individuals with deficits in socio-cognitive abilities may be more likely to conform to their peers and give in to peer pressure to drink to fit in with their peers than those with higher socio-cognitive abilities. To our knowledge, though, no prior studies have examined indirect effects of lower ToM on heavier alcohol use and more alcohol problems through peer pressure to drink in young people.

The aim of the current study is to investigate whether ToM deficits in a large sample ( $N = 472$ ) of underage (18–20 year old) drinkers are associated with binge drinking and alcohol problems, and whether there are indirect effects through perceived peer pressure to drink.<sup>1</sup> To be comprehensive, we assessed perceived peer pressure to drink in two ways. Specifically, we measured conformity motives to drink, which

<sup>1</sup> One prior study found that adolescents and young adults who had deficits in ToM were especially likely to binge drink in social settings in the presence of high conformity motives (Laghi et al., 2019). As such, we also tested whether our two measures of peer pressure to drink acted as moderators, such that individuals with lower ToM would report greater alcohol use and problems in the presence of higher conformity motives and lower self-efficacy to resist peer pressure to drink. These analyses resulted in null findings (see Supplementary Material for these results and a discussion of the findings).

refers to the level of conforming and engaging in alcohol use in response to external social pressures (Cooper, 1994), and self-efficacy to resist peer pressure to drink, which refers to the perceived self-efficacy to refuse alcohol in social situations (Young et al., 2007). Lower conformity motives and higher self-efficacy to resist peer pressure to drink are considered protective factors against problematic drinking (Laghi et al., 2019; Lannoy et al., 2020), and as such, we hypothesized that those with lower ToM would be more likely to report binge drinking and alcohol problems, and that lower ToM would have an indirect effect on binge drinking and alcohol problems via higher conformity motives and lower self-efficacy to resist peer pressure to drink. A better understanding of why lower ToM is associated with binge drinking and alcohol problems will inform treatment efforts aimed at targeting socio-cognitive abilities in the risk for alcohol misuse.

## 2. Methods

### 2.1. Participants

Participants were drawn from a previous study of underage (i.e., 18–20 year old) drinkers residing in the United States, who were recruited through an Amazon TurkPrime panel (see Skrzynski et al., 2018 for additional details). Eligible participants (i.e., 18–20 year old current alcohol drinkers residing in the United States) were sent a link to an online Qualtrics survey, which took approximately 30–45 min to complete. To control for careless responding, four questions to assess attention (i.e., “attention checks”) were randomly embedded within the survey. An example item was, “Select [option 3] if you are paying attention.” Among the 727 eligible participants, those who failed more than one attention check were excluded from the study ( $N = 219$ ). Of the remaining 508 participants, 480 completed all the measures we were interested in for the purposes of this study. Since we did not have a large amount of missing data (Bennett, 2001), we opted to exclude the 5.5 % of participants that did not fill out all the measures using listwise deletion ( $n = 28$ ).<sup>2</sup> The study was approved by the Carnegie Mellon University Institutional Review Board, with all participants providing informed consent. Payment was designated as \$5 through the TurkPrime panel website. The final sample included 472 individuals (91 % female; 71 % White;  $M_{\text{age}} = 19.28 \pm 0.77$ ).

## 3. Measures

### 3.1. Theory of mind

ToM was measured using the Reading the Mind in the Eyes Task-Revised (RMET-R; Baron-Cohen et al., 2001). The RMET-R is a standard instrument for measuring ToM in which participants have to infer affective and cognitive mental states from 36 images of the eye region alone. Each stimulus is presented on a large screen for 25 s and participants are requested to choose the corresponding mental state among four options on the answer sheet (only one answer-option is correct). The stimuli represent positive (e.g., ‘joking’) and negative (e.g., ‘sad’) emotions and neutral (e.g., ‘serious’) mental states. Due to time constraints and concerns about response burden, we included a subset of 18 of the original 36 items in the present study, which represented a range of items spanning easier to more difficult items (see Supplementary Scale 1 for the exact items used). Cronbach's alpha for this measure was 0.63, which is similar to alpha values reported in previous studies using the full measure in young adult samples (e.g., Laghi et al., 2019; Lyvers et al., 2017; 2018).

<sup>2</sup> An additional 8 participants were excluded because they reported their parental education as “don't know or does not apply”. All results remained the same when including these 8 participants.

### 3.2. Binge drinking and problems

Binge drinking was assessed using one item that asked about the frequency of binge drinking ( $\geq 5$  drinks in 2 h for males,  $\geq 4$  drinks in 2 h for females; National Institute of Alcohol Abuse and Alcoholism [NIAAA], 2003) in the past 30 days. Alcohol problems were assessed using the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler et al., 2005), which is a 24-item measure that assessed a broad range of alcohol-related negative consequences typically experienced by college students. Reliability was good ( $\alpha = 0.90$ ).

### 3.3. Peer pressure to drink

Two measures were used to assess peer pressure to drink. First, conformity motives were assessed using the Drinking to Conform subscale of the Drinking Motives Questionnaire-Revised (DMQ-R; Cooper, 1994), which measured the participants' motivation for drinking to conform to others (e.g., to fit in with a group you like). Items were rated from 1 to 5, with 1 meaning "almost never/never" and 5 meaning "almost always/always". The DMQ-R has demonstrated good criterion validity (Kuntsche et al., 2006). Reliability was good ( $\alpha = 0.86$ ). Second, self-efficacy to refuse peer pressure to drink was measured using the Social Pressure Self-Efficacy subscale of the Drinking Refusal Self-Efficacy Questionnaire-Revised Adolescent Version (DRSEQ-RA; Young et al., 2007), which assessed the participants' belief in their ability refuse alcohol during social pressure (e.g., how sure are you that you could resist drinking alcohol when someone offers you a drink?). Items were rated from 1 to 6, with 1 corresponding to "I am very sure I could NOT resist drinking" and 6 corresponding to "I am very sure I could resist drinking". The DRSEQ-RA has demonstrated good criterion validity (Young et al., 2007). Reliability was good in this sample ( $\alpha = 0.92$ ).

### 3.4. Covariates

Gender, age, and parental education level (used as a proxy for socioeconomic status) were included as covariates in all models. Gender was coded 0 for females and 1 for males. Parental education level was assessed by asking "What was the highest level of education completed by your parents/guardian?". Options ranged from 1 to 6, with 1 corresponding to "completed grade school or less" to 6 corresponding to "graduate or professional school after college".

### 3.5. Statistical analyses

Analyses were run in SPSS (IBM Corp., 2017). Bivariate correlations were first run to examine associations between study variables. For indirect effect models (described below), ToM was included as the primary predictor variable and covariates were included. Two outcome variables were examined: binge drinking and alcohol problems. Conformity motives and self-efficacy to refuse peer pressure to drink had a weak negative association ( $r = -0.30$ ,  $p < 0.01$ ), so these variables were examined separately.

We used non-parametric bootstrapping to account for the highly non-normal distributions of both outcome variables (Pek et al., 2018), and we report robust standard errors estimates using the Cribari-Neto heteroskedasticity consistent standard error and covariance matrix estimator (HC4) to help reduce biases due to violation of the homogeneity assumption. To test for indirect effects, two sets of models were run using the PROCESS add-on in SPSS (Hayes, 2017). The first set of models assessed indirect effects through conformity motives, and the second set of models assessed indirect effects through self-efficacy to refuse peer pressure to drink. We additionally ran a supplementary model with both terms (i.e., conformity motives and self-efficacy to refuse peer pressure to drink) included in one model.

## 4. Results

### 4.1. Bivariate correlations among study variables

Table 1 displays bivariate correlations among study variables. All correlations were in the expected direction. Lower ToM was associated with lower self-efficacy to resist peer pressure to drink, higher conformity motives, and more frequent binge drinking. ToM was not significantly associated with alcohol problems. Higher conformity motives were associated with lower self-efficacy to refuse peer pressure to drink, more frequent binge drinking, and greater alcohol problems. Lower self-efficacy to refuse peer pressure to drink was associated with more frequent binge drinking and greater alcohol problems. More frequent binge drinking was associated with greater alcohol problems.

### 4.2. ToM on alcohol outcomes: Conformity motives and self-efficacy to resist peer pressure to drink in separate models

Table 2 displays models examining indirect effects of ToM on (a) binge drinking and (b) alcohol problems first through conformity motives and then through self-efficacy to resist peer pressure to drink in separate models. There was no direct effect of ToM on either binge drinking or alcohol problems in any model. As seen in Model 1a, there was an indirect effect of ToM on binge drinking through conformity motives; lower ToM was associated with higher conformity motives, which were then associated with more frequent binge drinking (see Fig. 1). There was also an indirect effect of ToM on alcohol problems through conformity motives; lower ToM was associated with higher conformity motives, which was then associated with greater alcohol problems (Model 1b, see Fig. 2). There was no indirect effect of ToM on either binge drinking (Model 2a) or alcohol problems (Model 2b) through self-efficacy to resist peer-pressure to drink (see Figs. 3 and 4).

### 4.3. ToM on alcohol outcomes: Conformity motives and self-efficacy to resist peer pressure to drink in the same model

Table 3 displays the supplementary models examining the indirect effects of ToM on (a) binge drinking and (b) alcohol problems through both conformity motives and self-efficacy to resist peer pressure to drink in the same model (see Figs. 5 and 6). There was no direct effect of ToM on either binge drinking or alcohol problems in any model. As seen in model 3, there was an indirect effect of ToM on alcohol problems (Model 3b), but not binge drinking (Model 3a). Lower ToM was associated with higher conformity motives, which was then associated with greater alcohol problems. There was no indirect effect of ToM on either binge drinking (Model 3a) or alcohol problems (Model 3b) through self-efficacy to resist peer pressure to drink.

## 5. Discussion

Researchers have proposed that adolescents with socio-cognitive difficulties may misperceive and over-value peers' attitudes/norms about drinking and consider drinking a way to be accepted by their peer group (Laghi et al., 2019). We tested this hypothesis by investigating whether ToM deficits in young adult drinkers were associated with binge drinking and alcohol problems, and whether there were indirect effects of ToM on alcohol outcomes through conformity motives and self-efficacy to resist peer pressure to drink. Contrary to expectations, the direct associations between ToM and binge drinking and alcohol problems were not significant in indirect effect models that also included sociodemographic variables, although there was a significant bivariate correlation between ToM and binge drinking, replicating prior studies (Laghi et al., 2019; Lyvers et al., 2018; 2019). When examining indirect effects through perceived peer pressure to drink in separate models, we found indirect effects of ToM on binge drinking and alcohol problems through conformity motives, but not self-efficacy to resist peer pressure

**Table 1**  
Correlations among study variables (n = 472).

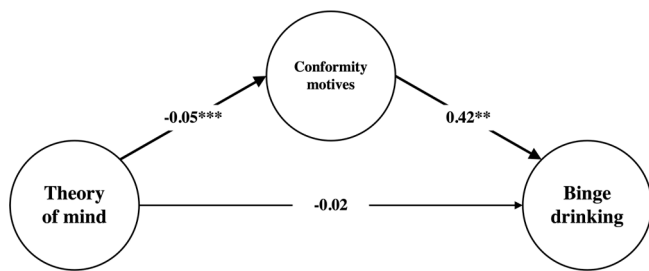
	Gender	Age	Parent education	ToM	Conformity motives	Self-efficacy	Binge drinking
<b>Gender</b>							
<b>Age</b>	0.03						
<b>Parent education</b>	-0.01	0.02					
<b>ToM</b>	-0.19**	-0.07	0.09*				
<b>Conformity motives</b>	0.26**	0.04	-0.04	-0.22**			
<b>Self-efficacy</b>	-0.06	0.10*	0.05	0.09*	-0.31**		
<b>Binge drinking</b>	0.10*	0.05	-0.05	-0.09*	0.22**	-0.35**	
<b>Alcohol problems</b>	0.09*	-0.01	-0.05	-0.05	0.44**	-0.54**	0.50**

Note. Gender (0 = Females, 1 = Males); ToM = Theory of mind; Self-efficacy = Self-efficacy to resist peer-pressure to drink; Alcohol problems = B-YAACQ scores. \*p < 0.05, \*\*p < 0.01.

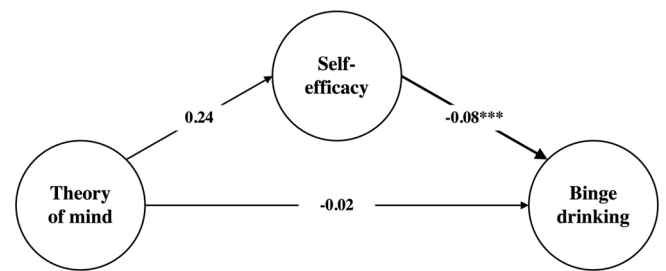
**Table 2**  
Indirect effects of ToM on (a) Binge Drinking and (b) Alcohol Problems (n = 472).

Mediator	Effect	Model Set A: Binge drinking			Model Set B: Alcohol problems		
		Estimate	SE	95 % CI	Estimate	SE	95 % CI
<b>Model 1:</b>	Direct effect	-0.02	0.03	[-0.08, 0.04]	0.10	0.01	[-0.08, 0.28]
<b>Conformity motives</b>	Indirect effect	-0.02*	0.01	[-0.04, -0.01]	-0.16*	0.05	[-0.26, -0.06]
<b>Model 2:</b>	Direct effect	-0.02	0.03	[-0.08, 0.03]	0.04	0.09	[-0.13, 0.21]
<b>Self-efficacy</b>	Indirect effect	-0.02	0.01	[-0.04, 0.00]	-0.10	0.05	[-0.20, 0.00]

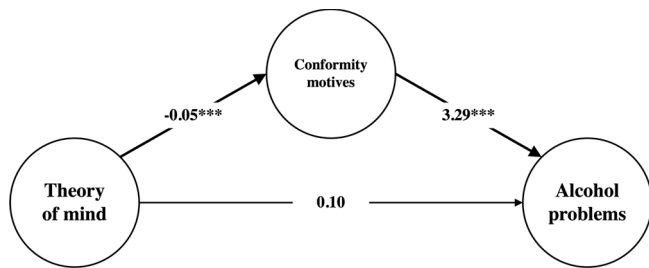
Note. ToM = Theory of mind; Self-efficacy = Self-efficacy to resist peer-pressure to drink; Alcohol problems = B-YAACQ scores. \*p < 0.05.



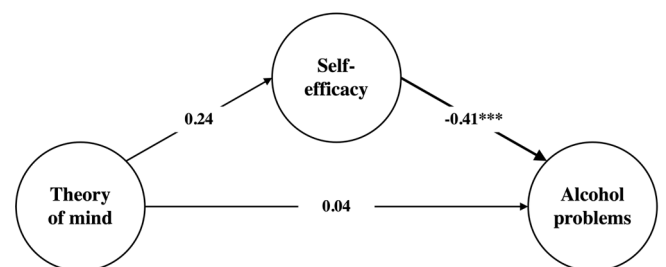
**Fig. 1.** ToM on Binge Drinking: Conformity Motives. Note. Indirect effects of ToM on binge drinking through conformity motives.



**Fig. 3.** ToM on Binge Drinking: Self-efficacy to Resist Peer Pressure to Drink. Note. Indirect effects of ToM on binge drinking through self-efficacy to resist peer pressure to drink.



**Fig. 2.** ToM on Alcohol Problems: Conformity Motives. Note. Indirect effects of ToM on alcohol problems through conformity motives.



**Fig. 4.** ToM on Alcohol Problems: Self-Efficacy to Resist Peer Pressure to Drink. Note. Indirect effects of ToM on alcohol problems through self-efficacy to resist peer pressure to drink.

to drink. These findings are consistent with the idea that individuals with lower ToM may drink more with their peers as a way to fit in. This desire to fit in with their peers could contribute to an escalation of drinking and the development of alcohol problems. Importantly, though, this was a cross-sectional study, which prevents drawing temporal or causal conclusions on the associations between ToM and alcohol use and problems. Future studies should use prospective designs and social cognition/ToM manipulations in laboratory experiments to establish whether socio-cognitive abilities predict binge drinking and alcohol problems, and whether perceived peer pressure to drink temporally mediates these associations. If so, interventions that aim to reduce conformity motives could show promise in reducing alcohol use

and problems in adolescents and young adults (but see Cousijn et al., 2018).

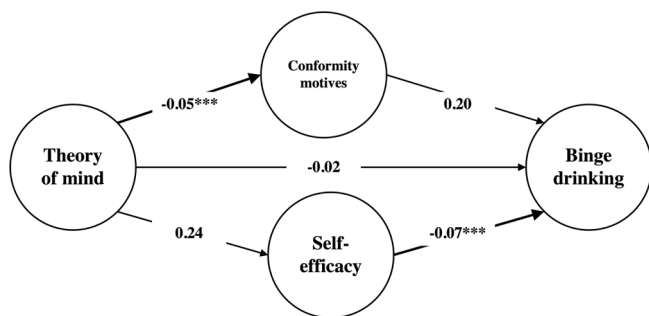
Interestingly, we only found an indirect effect through conformity motives and not confidence in one's ability to resist peer pressure to drink and, when including both variables in the same model, there continued to be an indirect effect of ToM on alcohol problems, but not binge drinking, through conformity motives. These findings suggest that deficits in ToM are associated with an increased desire to drink to fit in with peers but are not associated with individuals' perceptions of their ability to say no to drinking in social situations. This could be because

**Table 3**  
Supplementary analysis: Indirect effects of ToM on (a) Binge Drinking and (b) Alcohol Problems through Conformity Motives and Self-Efficacy to Resist Peer Pressure to Drink.

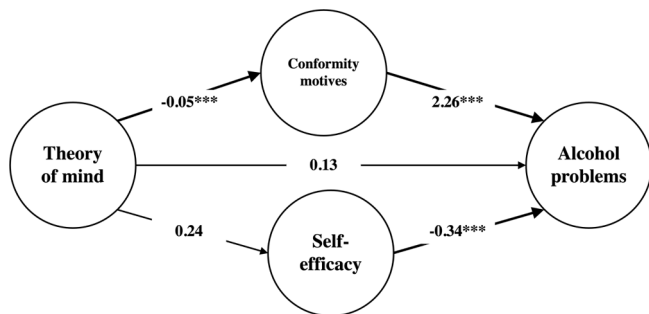
Model 3	Model Set A: Binge drinking			Model Set B: Alcohol problems		
	Estimate	SE	95 % CI	Estimate	SE	95 % CI
Direct effect	-0.02	0.03	[-0.07, 0.04]	0.13	0.08	[-0.03, 0.29]
Total effect	-0.03*	0.01	[-0.05, -0.00]	-0.18*	0.06	[-0.32, -0.07]
Indirect effect: conformity motives	-0.01	0.01	[-0.03, 0.00]	-0.11*	0.04	[-0.19, -0.04]
Indirect effect: self-efficacy	-0.02	0.01	[-0.04, 0.00]	-0.08	0.04	[-0.17, 0.00]

Note. ToM = Theory of mind; Self-efficacy = Self-efficacy to resist peer-pressure to drink; Alcohol problems = B-YAACQ scores.

\*p < 0.05.



**Fig. 5.** ToM on Binge Drinking: Conformity motives and self-efficacy to resist peer pressure to drink. Note. Indirect effects of ToM on binge drinking through conformity motives and self-efficacy to resist peer pressure to drink.



**Fig. 6.** ToM on Alcohol Problems: Conformity Motives and Self-Efficacy to Resist Peer Pressure to Drink. Note. Indirect effects of ToM on alcohol problems through conformity motives and self-efficacy to resist peer pressure to drink.

self-efficacy to resist peer pressure to drink is less about knowing what other people think and feel, and more about the belief and confidence in oneself in resisting peer pressure (Young et al., 2007). Therefore, young adults could still be giving into peer pressure to drink but may not believe that they are doing so. More research is needed to explore these somewhat counterintuitive findings, though, perhaps by examining young adults' actual ability to resist peer pressure to drink rather than just their belief in their ability to do so. Taken together, our results suggest that conformity motives in particular might explain the link between lower ToM and alcohol problems. Future longitudinal studies are necessary, however, to confirm these cross-sectional findings.

The present study has limitations. As noted above, this was a cross-sectional study and future studies with more rigorous designs (e.g.,

prospective, experimental) are needed. In addition, due to time constraints and concerns about participant burden, an 18-item subset of the original 36 items in the RMET measure was used. Using a subset of the ToM measure could have resulted in different findings compared to studies that include the entire measure. However, items were chosen to represent a range of items spanning easier to more difficult items, and internal consistency of the measure (i.e., Cronbach's alpha) in this sample matched prior studies (Laghi et al., 2019; Lyvers et al., 2017; 2018). Still, future studies should replicate findings using the original RMET measure. Third, although many studies have used the RMET to assess ToM (e.g., Laghi et al., 2019; Lyvers et al., 2018; 2019), some researchers have suggested that the RMET assesses emotion recognition rather than ToM (Oakley et al., 2016). Future studies should aim to use different or multiple measures of ToM, such as the Faux Pas Test (Stone et al., 1998) or Yoni's task (Shamay-Tsoory & Aharon-Peretz, 2007). Fourth, this study used attention checks as an insurance against biased or poor responding, and we excluded participants who got more than one attention check incorrect, but we did not check for patterned responding (e.g., intra-individual response variability), which might have also been useful to ascertain (Dunn et al., 2016; Johnson, 2005; Marjanovic et al., 2015). Finally, the majority of participants were female and white. While these demographics are common when using recruitment sites like MTurk (Berinsky et al., 2012), it may limit the generalizability of the findings to non-female and non-white samples. Future studies are needed to replicate these findings among more diverse samples.

The present study also has several strengths. First, we were able to examine associations between ToM and alcohol use and problems in a large sample of US underage drinkers. Additionally, this is the first study to test for and find indirect effects of ToM on alcohol consumption and drinking problems through conformity motives in an underaged sample. Our findings add to a growing literature indicating the risks of lower socio-cognitive abilities on alcohol consumption and problems among young people (Kumar et al., 2022a; Laghi et al., 2019; Lannoy et al., 2020) by suggesting a potential underlying mechanism in the link between lower ToM and alcohol misuse.

**CRedit authorship contribution statement**

**Lakshmi Kumar:** Conceptualization, Methodology, Formal analysis, Visualization, Writing – original draft. **Agnes Zhou:** Writing – review & editing. **Bethany Sanov:** Writing – review & editing. **Sara Beitler:** Writing – review & editing. **Carillon J. Skrzynski:** Conceptualization, Methodology, Investigation, Writing – review & editing. **Kasey G. Creswell:** Conceptualization, Methodology, Resources, Supervision, Funding acquisition, Writing – review & editing.

**Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**Data availability**

Data will be made available on request.

**Appendix A. Supplementary material**

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.abrep.2022.100468>.

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