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Perceiving college peers' alcohol consumption: temporal patterns and individual differences in overestimation

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ABSTRACT

Objective: This study examines temporal patterns and individual differences of overestimation in alcohol norm perception within a social network.

Design: Hundred psychology freshmen indicated biweekly during their first semester the drinks they consumed, the perceived average of their peers' consumption, and with whom they were acquainted. At baseline, trait self-control was assessed.

Main outcome: The moderation of alcohol consumption overestimation by time and individual characteristics was explored.

Results: Results show that students overestimated alcohol consumption of their acquainted peers by 1.22 drinks ($p < .001$). For time periods at which peers reported high consumption, overestimation decreased. Additionally, individuals reporting high alcohol consumption ($b = -0.25$, $p < .001$) and low self-control ($b = 0.27$, $p = .010$) showed higher overestimation.

Conclusions: Students overestimate the alcohol consumption of peers not fully accounting for changes in peer-reports. Furthermore, individual differences suggest informational and motivational processes underlying overestimation.

KEYWORDS

Social network; perception bias; false-consensus; misperception; social norm; alcohol

Frequent consumption of alcohol in college has negative effects both at college and in later life like bad grades (Singleton & Wolfson, 2009) and a higher risk for development of alcohol dependence even 10 years later (Jennison, 2004). One factor increasing alcohol consumption at college is the perception of peers' alcohol consumption (e.g., Borsari & Carey, 2001; Perkins, 2007). Yet, a consistent body of evidence shows that most students perceive their classmates' alcohol consumption as higher than their own behaviour, denoting an overestimation bias in this perception of peers (Borsari & Carey, 2003; Perkins, 2007; Perkins, Haines, & Rice, 2005). Several authors see this overestimation as a cause for concern as they think it escalates the problem of alcohol consumption in college (Carey, Borsari, Carey, & Maisto, 2006; Perkins, 1997), for example because of social modelling effects (Perkins, 2007). However, the empirical evidence for the idea that overestimation increases alcohol use is mainly indirect. It is inferred from the correlation between individuals' perception of their peers and their

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self-reported drinking (Perkins et al., 2005). Direct tests of the relationship between overestimation and self-reported alcohol consumption are difficult to find as they are often assessed not independently of each other (Carey et al., 2006).

In addition to the fact that the evidence for a negative effect of overestimation is indirect, studies are inconclusive concerning the proposed causes of how overestimation might develop. Perkins (1997) argues that overestimation may result from attentional and memory bias to more extreme behaviours as well as its attribution to stable dispositions. Others acknowledge that inaccuracies in perception of peers might also be due to not knowing all people one is referred to (Galesic, Olsson, & Rieskamp, 2012; Giese et al., 2015; Pape, 2012). Specifically, Galesic et al. (2012) argue that general overestimation effects may be explained by only regarding the behaviour of the individual's closer social surrounding, but never directly tested this assumption. In order to shed more light on both causes and consequences of overestimation, this study proposes two approaches: investigating how overestimation evolves and exploring individual differences in the overestimation of alcohol consumption. The study is conducted in a newly evolving social network, which ensures that there is a dynamic of getting acquainted to each other.

Time course of overestimation

Understanding the time course of the development of overestimation bias in newly forming groups can help to evaluate some ideas about underlying mechanisms. For instance, if familiarity with the group helps to accurately perceive alcohol consumption of peers, overestimation bias should decrease across time as students grow acquainted with each other. Moreover, one would expect an increase of alcohol consumption within the group, if the bias has an escalating effect on alcohol consumption in college. According to this idea, overestimation might then also decrease as students yield to the norms they perceived (Perkins, 1997). While early findings observing changes across two months can be interpreted according to this pattern (Prentice & Miller, 1993), other studies with a similar time frame could not find any change in overestimation (Neighbors, Dillard, Lewis, Bergstrom, & Neil, 2006) leaving this issue unresolved. Apart from the perspective of a general time trend, one can see that there are strong monthly fluctuations of alcohol consumption within the course of a college year (Del Boca, Darkes, Greenbaum, & Goldman, 2004). These changes may or may not be accounted for by the perception of peers' alcohol consumption dependent on how much students consider peers drinking to be stable across time.

Individual differences in overestimation

The second approach that might help to address questions on the causes and effects of alcohol consumption overestimation is the use of social network that considers who knows whom within the group. In this approach, overestimation can be defined as the difference between the average consumption of the group as perceived by an individual and the average of actual consumption reported by all *acquainted* peers. This helps to address two issues: First, it allows to evaluate whether overestimation

persists when taking into account that individuals in a group are not typically acquainted with all others in this group (Pape, 2012). Second, it enables to determine who overestimates more than others by providing individual estimates of overestimation independent of what the individual reports to consume (Simons-Morton & Kuntsche, 2012). In this way, the proposed relationship between overestimation bias and self-reported alcohol consumption of college students can be explored directly (Carey et al., 2006; Perkins, 1997).

Likewise, relationships of individual differences in overestimation to other individual differences can be assessed. One personality characteristic that is highly likely to decrease overestimation bias is self-control. Self-control, defined as "the capacity to alter or override dominant response tendencies and to regulate behaviour, thoughts, and emotions" (de Ridder, Lensvelt-Mulders, Finkenauer, Stok, & Baumeister, 2012), was shown to decrease effects of social influences on alcohol consumption. For instance, Wills et al. (2010) found that high trait self-control buffered adverse effects of peer perception on alcohol consumption in adolescents. Similarly, experiments demonstrated that self-control depletion increases the role of social influence (Burkley, Anderson, & Curtis, 2011). These buffering effects of self-control might also affect overestimation, in the sense that they either might strategically adjust perception or simply overgeneralise their own controlling abilities. Another reason to expect attenuating effects of self-control on overestimation is that it has been shown already regarding peers' delinquency behaviours (Young, Barnes, Meldrum, & Weerman, 2011). Therefore, self-control might play a similar bias-attenuating role in perception of peers' alcohol consumption. This might also be the case, because correctly retrieving and integrating behavioural information of others can be regarded as an exercise in self-control (de Ridder et al., 2012; Young et al., 2011).

Present study

In sum, this study aims to further explore overestimation effects of peer alcohol consumption in college freshmen. By comparing perceptions of peers' alcohol consumption to the average of only acquainted individuals, the first aim is to scrutinize whether selective attention to specific others in a group is able to explain overestimation. Second, this study investigates the temporal patterns of overestimation to see how it evolves over time. Third, individual differences in overestimation are explored. Specifically, the relationship of overestimation to self-reported alcohol consumption and self-control are evaluated.

Method

Participants and procedure

On October 21st 2014, 117 attendees of an introductory psychology class at the University of Konstanz were invited to take part and informed about the study procedure in class. The study tried to reach as many people as possible that were freshmen of psychology in the year 2014. During the next two weeks, 100 people consenting to participate in a large study on health and social networks (79% female) were included

in the study (extending on the infrastructure of a social network study (SOZNET); (Hartung & Renner, 2013)). This sample is sufficiently powered ($\beta < .2$) to detect at least medium-sized effects (i.e. product-moment correlations at r .30, mean difference testing at d .50) at a significance level of α .05 (Cohen, 1992). In the following, we describe the variables relevant to the current research question. A baseline questionnaire in the last week of October consisted of participants' age, gender, and traits such as self-control. The following week and then every two weeks (except for a 3-week interval at Christmas), participants indicated their alcohol consumption of the previous week, their perceived peer alcohol consumption and all people they knew (for descriptive statistics, see Table 1). This procedure was repeated eight times. All 100 consenting participants filled out the baseline questionnaire. In the course of the semester 761 out of 800 possible entries were useable (4.9% attrition, for 3 no data to acquaintances was available). University of Konstanz ethical review board approved the study.

Measures

Self-reported alcohol consumption. Past-week alcohol consumption was assessed via a quantity approach. In an open-ended question, participants were asked to indicate the number of glasses of alcohol they had consumed the past week ("*How many glasses of alcoholic beverages did you consume in the past week?*", see also Cullum, Armeli, & Tennen, 2010; Neighbors et al., 2006). While this measure does only allow to estimate the number of drinks but not the grams of alcohol consumed, it was chosen in order to obtain easily accessible information on the same scale for both the individual and its perception of peers.

Perceived peer alcohol consumption. Corresponding to self-reports of alcohol consumption, perception of the quantity of alcohol consumption of an average person of the class was assessed ("*How many glasses of alcoholic beverages did an average person of your class consume in the past week?*", see also Cullum et al., 2010; Neighbors et al., 2006). To avoid confusion to which group to refer to, "class" was defined in the course of the questionnaire to include only all psychology freshmen of the year 2014.

Acquaintance nominations. All participants were given a list with names and photos of all other participants agreeing to take part in the study. They were asked to indicate all people they knew better than sight ("*Please select 'know better than sight', if you have talked at least once to this person for a longer time*"). On average, participants

Table 1. Descriptive statistics.

	M	SD_{within}	$SD_{between}$	ICC	2	3	4	5
1. Self-reported consumption	4.50	4.10	3.98	.49	.58**	.41**	.20	.00
2. Perceived peer consumption	5.53	2.52	2.42	.48		.39**	.26**	.10
3. Acq.-reported consumption	4.29	1.46	0.89	.27			.19+	.06
4. Self-control	3.17		0.54					.02
5. Age	21.06		5.42					

Notes. The mean refers to the total average. Variation is separated in a within individual and between individual part and ICC reports the proportion of between variance. Correlations are displayed for between-variances only.
*$p < .05$, **$p < .01$.

knew about 38 other participants better than sight (M 38.34, SD_{within} 6.64, $SD_{between}$ 17.75, *ICC* .88, *Range*: 0–95).

Acquaintances-reported alcohol consumption. To assess the alcohol consumption behaviour of peers, the self-reported alcohol consumption of all acquaintances nominated by a student were averaged for each student at each time point. For one time point, one participant indicated no acquaintances. In that single case, the mean of acquaintances-reported alcohol consumption of that time point was included (see also Ripley, Snijders, Preciado, & Steglich, 2015).

Self-control. Trait self-control was assessed at baseline via a German adaptation of the brief self-control scale generally assessing "the ability to override or change one's inner responses, as well as to interrupt undesired behavioural tendencies (such as impulses) and refrain from acting on them" (Sproesser, Strohbach, Schupp, & Renner, 2011; Tangney, Baumeister, & Boone, 2004). The mean score of all items was assessed (α .85).

Statistical analysis

In order to compare the number of drinks per week students perceive their peers to consume with the number of drinks peers report consuming, a GLM approach with multilevel regression modelling was applied in the R multilevel package nlme 3.1 (Field, Miles, & Field, 2012; Pinheiro, Bates, DebRoy, Sarkar, & CoreTeam, 2015) with maximum likelihood estimators. By using maximum likelihood estimators, missing values are automatically taken into account (e.g., Bolger & Laurenceau, 2013). The effects of two within-individual factors on the number of drinks per week were tested with χ^2-tests (see Table 2 with results). The estimated regression coefficients of the final model were evaluated by t-tests. An approximate r of each coefficient was additionally derived from degrees of freedom and t-values to have some, albeit crude, indication of effect size (see Table 3, Field et al., 2012). In addition, simple effects were probed in the final model by applying a different coding scheme as recommended by Aiken and West (1991) and regions of significant simple slopes were determined as described in Preacher, Curran, and Bauer (2006) to illustrate interactions.

Table 2. Stepwise test of models predicting number of drinks per week comparing perceived to acquaintances-reported consumption.

Step	Model	χ^2	p-value	df(total)	AIC
0	Baseline			5	7225.787
1	Target	96.334	<0.001	6	7131.453
2	Time	325.768	<0.001	13	6819.684
3	Target × Time	21.937	0.003	20	6811.747
4	Self-reported Consumption	45.52	<0.001	21	6768.227
5	Self-reported Consumption × Target	110.996	<0.001	22	6659.231
6	Self-reported Consumption × Time	25.235	<0.001	29	6647.996
7	Self-reported Consumption × Target × Time	15.26	0.033	36	6646.736
8	Self-control	3.764	0.052	37	6644.972
9	Self-control × Target	6.879	0.009	38	6640.094

Table 3. Final model of overestimation bias in perceived peer consumption compared to acquaintances-reported consumption in number of drinks per week.

							$CI_{95\%}$	
Effects on number of drinks per week	*b*	SE	df	*t*-value	*p*	r[a]	LL	UL
Intercept	5.52	0.13	741	42.16	<0.001	0.84	5.27	5.78
Target								
Dummy target (acq.-reported = 1)	1.22	0.10	741	11.80	<0.001	0.40	1.42	1.02
Time								
Time point 2	0.13	0.19	647	0.66	0.508	0.03	0.24	0.50
Time point 3	0.25	0.19	647	1.32	0.187	0.05	0.62	0.12
Time point 4	0.21	0.19	647	1.09	0.275	0.04	0.16	0.59
Time point 5	2.08	0.20	647	10.62	<0.001	0.39	1.70	2.46
Time point 6	0.75	0.19	647	3.90	<0.001	0.15	1.13	0.38
Time point 7	0.99	0.19	647	5.16	<0.001	0.20	1.36	0.62
Time point 8	0.48	0.20	647	2.42	0.016	0.09	0.87	0.10
Target × *Time*								
Dummy target								
× Time point 2	0.03	0.27	741	0.10	0.923	0.00	0.55	0.50
× Time point 3	0.10	0.27	741	0.39	0.700	0.01	0.42	0.62
× Time point 4	0.90	0.27	741	3.27	0.001	0.12	0.37	1.43
× Time point 5	0.54	0.28	741	1.94	0.052	0.07	0.00	1.07
× Time point 6	0.88	0.27	741	3.24	0.001	0.12	1.41	0.35
× Time point 7	0.13	0.27	741	0.50	0.620	0.02	0.39	0.66
× Time point 8	0.39	0.28	741	1.40	0.162	0.05	0.94	0.15
Self-reported Consumption								
Self-reported consumption	0.33	0.03	97	10.51	<0.001	0.73	0.27	0.39
Self-reported Consumption × *Target*								
Self-reported consumption × dummy target	0.25	0.02	741	10.12	<0.001	0.35	0.30	0.20
Self-reported Consumption × *Time*								
Self-reported Consumption								
× Time point 2	0.02	0.04	647	0.37	0.708	0.01	0.07	0.10
× Time point 3	0.08	0.04	647	1.78	0.075	0.07	0.17	0.01
× Time point 4	0.03	0.05	647	0.74	0.461	0.03	0.12	0.05
× Time point 5	0.19	0.05	647	4.18	<0.001	0.16	0.10	0.28
× Time point 6	0.15	0.05	647	3.26	0.001	0.13	0.23	0.06
× Time point 7	0.09	0.05	647	2.01	0.044	0.08	0.18	0.00
× Time point 8	0.08	0.05	647	1.81	0.071	0.07	0.01	0.17
Self-reported Consumption × *Target* × *Time*								
Self-reported consumption × dummy target								
× Time point 2	0.00	0.06	741	0.07	0.941	0.00	0.13	0.12
× Time point 3	0.09	0.06	741	1.41	0.158	0.05	0.03	0.21
× Time point 4	0.08	0.06	741	1.31	0.191	0.05	0.04	0.21
× Time point 5	0.14	0.06	741	2.11	0.035	0.08	0.26	0.01
× Time point 6	0.11	0.06	741	1.79	0.073	0.07	0.01	0.24
× Time point 7	0.05	0.06	741	0.84	0.402	0.03	0.07	0.18
× Time point 8	0.12	0.07	741	1.78	0.075	0.07	0.24	0.01
Self-control								
Self-control	0.37	0.13	97	2.80	0.006	0.27	0.64	0.11
Self-control × *Target*								
Self-control × dummy target	0.27	0.10	741	2.60	0.010	0.09	0.07	0.47

Notes. Random intercepts were modelled for each person (1.07), time points within each person (0.00), and target within time point within each person (1.99, Residual:0.05). The dummy variable *Target* is coded such that main effects indicate perceived peer consumption effects (dummy = 0) and the dummy term tests the difference of perceived peer consumption to peer-reported consumption (dummy = 1). *Time* effects are effect coded and compare the specific time point to the average of all time points (effect-coded). The other moderators are z-standardized. a This is only a rough approximation to an effect size based on degrees of freedom and t-value (Field et al., 2012) and should be interpreted with caution.

The following effects were specified: *Target* (dummy coded with perceived peer consumption as reference) denotes the difference of perceived peer consumption to acquaintances-reported alcohol consumption. As such, *Target* evaluates the effects of overestimation in the perception of peers' alcohol consumption. *Time* (effect-coded with T1 as reference) compares the deviance of a specific time point to the average across time points therefore denoting variation across time. Following this definition, *Target* × *Time* effects test whether the difference between perceived peer consumption and acquaintances-reported consumption, i.e. overestimation, changes across time points.

In order to explore which individuals overestimated consumption of their peers more than others, average self-reported consumption (grand mean centred individual means) and trait self-control (z-standardized) were used. Accordingly, in the final model *Self-reported Consumption*, *Self-reported Consumption* × *Target*, *Self-reported Consumption* × *Time*, *Self-reported Consumption* × *Target* × *Time*, *Self-control*, and *Self-control* × *Target* effects were added.

Results

Table 1 shows means, standard deviations and correlations of the main variables. The intraclass correlations (ICC) indicate that across the semester there was considerable variation in alcohol consumption and its perception. In general, the students perceived their peers to consume on average 5.53 drinks per week and reported on average that they themselves consumed 4.50 drinks. This difference between self-reports and peer perceptions was significant ($t(760)$ 5.74, $p < .001$, r .20). The alcohol consumption that only acquainted peers reported was even lower (4.29 drinks per week on average). Similar to the comparison with self-reports, the mean of acquaintances-reported consumption was significantly lower than peer perceptions of alcohol consumption (Table 2 Step 1) denoting overestimation.

Table 2 further illustrates that overestimation varied across *Time* and was moderated by average *Self-reported Consumption* and *Self-control*. While the moderation by *Self-reported Consumption* also varied in strength across *Time*, all higher order interactions were insignificant (all $ps > .260$) and excluded from the final model. Therefore, effects of *Self-reported Consumption* and *Self-control* on overestimation were deemed independent of each other. The specific effects are described below.

Time course of overestimation

Perceived peer alcohol consumption did not vary much before the Mid of December (T1–T4), increased at New Year's (T5) by 2.08 drinks above average ($t(647)$ 10.62, $p < .001$, r .39), and was lower than mean level for January and February (T6–T8; see Figure 1, Table 3).

Comparing perceived peer consumption with acquaintances-reported consumption across time, overestimation was displayed in 7 out of 8 time points (see Figure 1). Only at the time point Mid December (T4) overestimation bias decreased by so much (b 0.90 drinks, $t(741)$ 3.27, p .001, r .12) compared to the mean overestimation

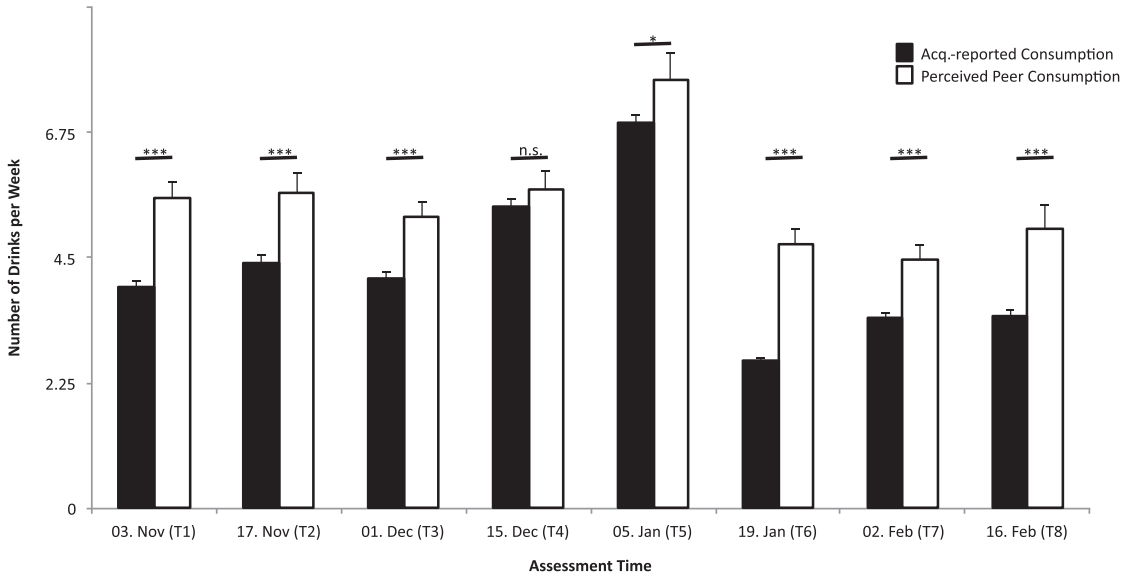

Figure 1. Overestimation of acquaintances' alcohol consumption quantity across the first semester. Notes. Means and standard errors of peer-reported and perceived peer consumption are shown. Simple contrasts testing overestimation at each time point are displayed. ns $p \geq .05$, $^{*}p < .05$, $^{***}p < .001$.

that the difference between perceived peer consumption and peer-reported consumption was not significant anymore (b 0.31, $t(741)$ 1.07, p .285, r .04).

As further indication that information about others did not affect overestimation, control analyses showed that neither the number of acquaintances known by an individual across the semester (b 0.010, $t(755)$ 1.49, p .137, r .05) nor at a specific time point (b 0.022, $t(755)$ 1.12, p .262, r .04) affected accuracy of the peer perception compared to the acquaintances-reported consumption. As the number of acquaintances had no effect on any result, final models are reported without accounting for it.

Individual differences in overestimation

Interaction tests showed an increase of overestimation by average self-reported alcohol consumption: for each drink participants consumed themselves overestimation increased on average by 0.25 drinks ($t(741)$ 10.12, $p < .001$, r .35). Specifically, students with high self-reported consumption (1 SD above the mean) overestimated their peers' alcohol consumption by 2.27 drinks ($t(741)$ 15.49, $p < .001$, r .49), whereas overestimation was decreased to 0.16 drinks and did not differ significantly from zero ($t(741)$ 1.10, p .272, r .04) for students reporting low alcohol consumption (1 *SD* below the mean, see Figure 2A). A floodlight analysis showed that overestimation ceased to be significant for students that indicated to drink less than about 0.46 drinks per week across the semester.

These bias-increasing effects were slightly stronger at New Year's (T5) (b 0.14, $t(741)$ 2.11, p .034, r .08): People high in consumption were opposing the general trend of less overestimation at this time point and more consistently biased. All other time-effects of self-reported consumption on overestimation were insignificant (see Table 3, *Self-reported Consumption* × *Target* × *Time*).

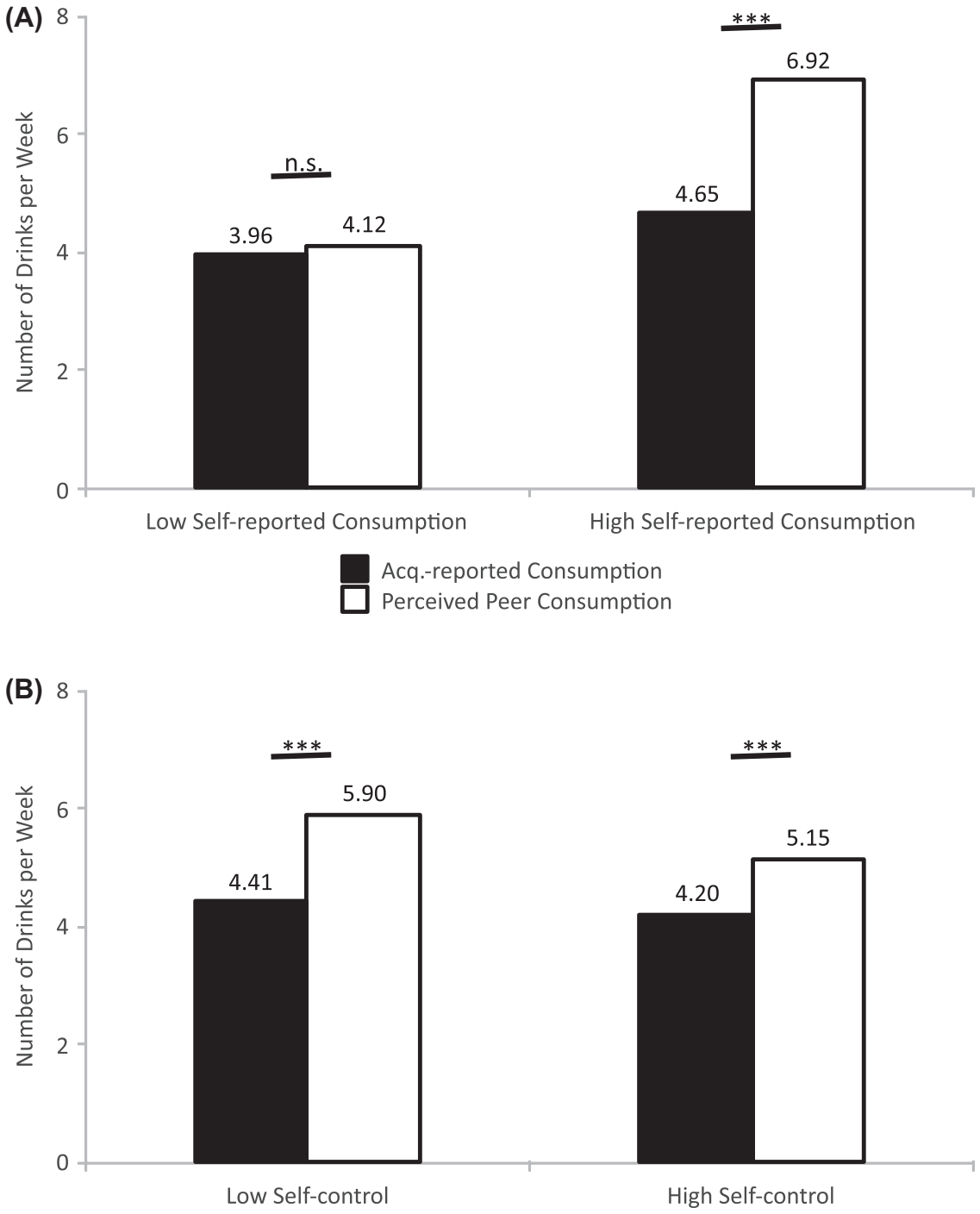

Figure 2. Simple effects of self-reported drinks and self-control regarding overestimation. Notes. High values consider 1 SD above and low values 1 SD below the mean. ns $p \geq .05$, $^{***}p < .001$.

Exploring additional trait effects, self-control was associated with decreased overestimation by 0.27 drinks per increase of one standard deviation ($t(741)$ 2.60, p .010, r .09). Specifically, simple effects revealed that overestimation decreased to 0.95 drinks ($t(741)$ 6.48, $p < .001$, r .23) for people high in self-control (1 SD above the mean) and increased to 1.49 drinks ($t(741)$ 10.09, $p < .001$, r .35) for people low in self-control (1 SD below the mean, see Figure 2B). A floodlight analysis showed that overestimation ceased to be significant for students with a self-control about 2.49 SD above the mean.

Discussion

Summarizing the main study findings, results showed an overestimation of peers' alcohol consumption moderated by time, self-reported consumption, and self-control. Overestimation of alcohol consumption quantity was shown throughout the semester, replicating the general notion of overestimation bias in perceived peer alcohol consumption (Perkins, 2007) in a German university (for another German sample, see McAlaney et al., 2015). It also shows that overestimation is prevalent even when regarding specific small groups (LaBrie, Hummer, Huchting, & Neighbors, 2009) and only taking acquaintances into account. This pattern illustrates that biased peer perception of alcohol consumption is not solely a function of selectively sampling information of acquainted others as suggested by Galesic et al. (2012) (see also Lerman, Yan, & Wu, 2016).

Time course of overestimation

Concerning temporal differences, it appears that perception of peers' alcohol consumption takes into account events like New Years that generally affect alcohol consumption unspecific to the referent group. All in all, overestimation increased when peer-reported consumption was low and diminished if peers reported high consumption. This can be interpreted in two different ways: first, students are more accurate in their perceptions of peer's alcohol consumption, if the base rate of the behaviour is high. A high base rate might help students to be more accurate as they get more instances to observe the behaviour and absence of behaviour might be more difficult to evaluate (Perkins, 1997). Alternatively, peers' actual alcohol consumption might be largely increasing during the holidays, but students do not fully account for these changes in their perceptions of peers. This relative insensitivity to detect changes in behaviour can be seen in concordance of attributional explanation of peer behaviour overestimation. According to this explanation, students tend not to fully account situational information and likely to infer dispositions from few observations (Perkins, 1997).

Furthermore, overestimation did not change systematically as time proceeded, while both alcohol consumption and peer-perception decreased. This can be seen as an indication that the group does not systematically adopt to its overestimation, but also that accuracy does not increase by being more familiar with ones acquaintances (Neighbors et al., 2006). This is also reflected in the fact that the number of acquaintances as another indicator of familiarity did not have an effect on accuracy, either. Yet, one has to note that these observations are confined to a fine-grained one semester period and might also include seasonal effects (Del Boca et al., 2004). These effects include a relative peak of consumption during Christmas and New Years that indicate festive activities and a decline towards the end of the semester, in which students tend to drink less while studying for their exams. Furthermore, effects might be different for longer time frames (Ferrer, Dillard, & Klein, 2012; O'Grady, Cullum, Tennen, & Armeli, 2011) and in concrete drinking situations (Moore et al., 2016).

Individual differences in overestimation

Supporting the notion of social influence on alcohol consumption (Perkins, 1997), both perceived peer consumption and peer-reported quantity of consumed alcohol were related to the general level of self-reported alcohol consumption. In addition, overestimation was positively related to self-reported alcohol consumption. This result complements previous findings of effects of own behaviour on overestimation (Prinstein & Wang, 2005) in several ways: it is based on a college sample, tests the effects longitudinally, and uses acquaintances instead of friends as reference. For friends one would generally expect less overestimation as they are more readily observable and more relevant to each individual (Borsari & Carey, 2003; Galesic et al., 2012; Larimer et al., 2009).

As the shown effects do not contain any temporal information, they can either be seen as individual evidence for an increasing effect of overestimation on alcohol consumption (Carey et al., 2006; Perkins, 1997) or social projection of own behaviour: People may as well utilise their own behaviour level as information, neglect other informational sources, and then self-defensively assume that the level of others' alcohol consumption is a bit higher than their own one (Prinstein & Wang, 2005). Though both influence and projection explanations are inseparable in the presented analyses, other methods tend to support the notion of projection of own behaviour (Cullum et al., 2010) also for other behaviours (de la Haye, Robins, Mohr, & Wilson, 2013). Lewis, Litt, and Neighbors (2015) argued based on their findings that both projection and social influence may affect drinking norm perception (see also Ferrer et al., 2012). Furthermore, because this finding pertains to perceived descriptive peer norms only, high consumers may be very well aware of health recommendations (Cooke, French, & Sniehotta, 2010).

Examining temporal fluctuations of this effect of own alcohol consumption on overestimation, findings revealed that individuals with high alcohol consumption are more consistently biased compared to those with low consumption: It appears to be the case that students with high alcohol consumption perceive seasonal changes in acquaintances-reported alcohol consumption more accurately, but at a generally higher level of overestimation. One possible explanation for this pattern might be a higher base-rate of alcohol consumption in the social surroundings of students with high alcohol consumption and thus more chances to observe changes (see also Giese, Stok, & Renner, 2017).

Another interesting issue is the finding that people with high self-control do not overestimate as much. Apparently, they were more inclined to correctly estimate peer behaviour (Young et al., 2011). Alternatively, they might project their controlling skills to others in their group or even decrease their perception of peer consumption as a mean in order to diminish adverse influences of the peer group on their alcohol intake (Wills et al., 2010). These findings underscore that the processes of overestimation are still not well understood. Social network studies might help to test which individuals are particularly prone to overestimation and how correct information might be conveyed.

Limitations

Some limitations apply to the presented approach besides general issues of impossibility to infer causality and direction of effects mentioned above. First and foremost, it is important to investigate in future studies whether the findings presented for one

network of 100 psychology freshmen generalise to a broader context and can be replicated in higher-powered samples. Second, peer-reported alcohol consumption and overestimation effects, even assessed in the network, still rely on the accuracy and validity of the self-reports. On the one hand, this pertains to the applied measure of alcohol consumption that only allows to estimate overestimation for a general drinking pattern in (non-standard) drinks, but not for the exact grams of alcohol consumed. On the other hand, it also entails that the bias found might also partially be explained by a systematic bias in self-reports, for instance caused by social desirability (Pape, 2012) or reactive elements to the assessment method (Melson, Davies, & Martinus, 2011). Yet, the extent to which self-reports of consumption are systematically biased appears to be small and is still under debate (e.g., Borsari & Muellerleile, 2009). Finally, the current approach compares the perception of the average of all peers to only the alcohol consumption reports of peers an individual was acquainted with. While the general and temporal patterns of overestimation do not diverge much when taking the average of all class members, estimates may still be distorted due to this definition. However, it is difficult to imagine how the perception of people an individual does not know and talk to can affect the general group perception of alcohol consumption. Rather, following the argument of selective attention to closer peers (Galesic et al., 2012), even a more conservative estimate of the overestimation effect was expected. All the presented limitations generally advocate for further research not only showing the existence of overestimation, but also systematically testing what mechanisms may contribute to the phenomenon.

Conclusion

In conclusion, perception of peer behaviour is biased as students overestimated peers' alcohol consumption quite consistent across time. Furthermore, they do not fully adjust their perception to changes in the behaviour of their surroundings. Overestimation was especially pronounced when students consumed more alcohol themselves and had low trait self-control. All these results exemplify the importance of assessing networks in addition to the perception of groups to discern social processes from other influences on group perception.

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