

Alcohol Protective Behavioral Strategies in Young Spanish Adults in the Community: A Prospective Study of Perceived Efficacy and Social Norms

Fermín Fernández-Calderón^{1,2}, Adrián J. Bravo³, Carmen Díaz-Batanero^{1,2}, Joseph J. Palamar⁴, and José Carmona-Márquez^{1,2}

¹ University of Huelva, ² Research Center on Natural Resources, Health and the Environment, ³ William & Mary, Williamsburg (USA), and ⁴ New York University Grossman School of Medicine (USA)

Abstract

Background: Protective behavioral strategies (PBS) have been shown to be useful for reducing excessive alcohol use and alcohol-related problems. However, research on the explanatory factors of PBS is limited. This paper prospectively examines the contribution of perceived efficacy of PBS in reducing alcohol-related consequences and perceived descriptive norms of close peers' PBS use in young adults. The mediating role of perceived efficacy of PBS between descriptive norms of PBS use and personal PBS use is also examined. **Method:** Targeted sampling was used to recruit a community-based sample of 339 young Spanish adults aged 18-25 years, who completed baseline and two-month follow-up questionnaires. Three types of PBS (serious harm reduction-SHR, manner of drinking-MOD, and stopping/limiting drinking-SLD) were measured. **Results:** Both perceived efficacy and descriptive norms at baseline were positively associated with personal PBS use (SHR, MOD and SLD) at follow-up. A partial mediation effect of perceived efficacy between descriptive norms and personal PBS use was found for the three PBS subscales. **Conclusions:** Our findings support the usefulness of correcting misperceptions of PBS use by peers in interventions aimed at reducing excessive drinking and alcohol-related consequences in young adults in the community. Moreover, PBS perceived efficacy should be included as a component of these interventions.

Keywords: Alcohol use, protective behavioral strategies, perceived efficacy, descriptive norms, young adults.

Resumen

Uso de Estrategias Conductuales de Protección Entre Jóvenes-Adultos Españoles: un Estudio Prospectivo de la Eficacia Percibida y las Normas Sociales. Antecedentes: las estrategias conductuales de protección (ECP) han mostrado utilidad para reducir el consumo excesivo de alcohol y sus problemas asociados, aunque la investigación sobre sus factores explicativos es escasa. Este trabajo examina la contribución de la eficacia percibida de las ECP para reducir las consecuencias negativas del alcohol, y la norma descriptiva percibida del uso de PBS de los iguales, en adultos jóvenes. Además, analiza el papel mediador de la eficacia percibida entre norma descriptiva y ECP. **Método:** mediante muestreo dirigido a poblaciones diana, 339 jóvenes españoles (18-25 años) comunitarios cumplieron cuestionarios basal y de seguimiento (dos meses), midiéndose tres tipos de ECP (reducción de daños-RR, forma de beber-FB, parar/limitar el consumo-PLC). **Resultados:** eficacia y norma se asociaron positivamente con el uso de ECP (RR/FB/PLC) en el seguimiento. Para los tres tipos de ECP se detectó un efecto de mediación parcial de la eficacia percibida entre la norma y el uso de ECP. **Conclusiones:** corregir percepciones erróneas del uso de ECP de los iguales puede ser útil en las intervenciones dirigidas a reducir el uso excesivo de alcohol y sus consecuencias en adultos jóvenes comunitarios, al igual que la inclusión de la eficacia percibida como uno de sus componentes.

Palabras clave: consumo de alcohol, estrategias conductuales de protección, eficacia percibida, normas descriptivas, adultos jóvenes.

Alcohol use, particularly excessive alcohol use, is prevalent among young-adults (World Health Organization [WHO], 2018), and is associated with a variety of potential negative consequences and risky behaviors, including injuries, traffic accidents, disabilities, premature deaths, violent behavior, risky sexual behavior, and harm to others (Kuntsche et al., 2017; López-Caneda et al., 2019; Nayak et al., 2019; Patrick et al., 2020; WHO, 2018). People who

use alcohol may use a variety of cognitive-behavioral strategies to reduce potential alcohol-related negative consequences. These strategies have been conceptualized as protective behavioral strategies (PBS, Martens et al., 2005; 2007), and typically include three distinct types (Pearson, 2013; Treloar et al., 2015): strategies associated with the manner of drinking (MOD, e.g., avoiding drinking games), serious harm reduction (SHR) strategies (e.g., using a designated driver) and strategies related to stopping/limiting drinking (SLD, e.g., alternating between alcoholic and nonalcoholic drinks).

Many interventions have focused on the promotion of PBS as a mechanism for reducing alcohol use and its negative consequences in young people (e.g., Dvorak et al., 2015; Edwards et al., 2020). Furthermore, an extensive body of research including longitudinal

studies has shown that using PBS is associated with lower alcohol use and fewer alcohol-related consequences (e.g., Dekker et al 2018; Fernández-Calderón et al., 2021; García et al., 2018; Napper et al., 2014). However, limited longitudinal research has examined factors that explain the increased/continual use of these strategies (cf. beliefs about PBS, Grazioli et al., 2018). The present study examines the contribution of two important variables in the psychological literature, outcome expectancies (operationalized in this study as the perceived efficacy of PBS to reduce alcohol-related negative consequences) and perceived descriptive norms about the use of PBS by others. Moreover, we examined the role of perceived efficacy as a vehicle (mediating process) through which descriptive norms impact personal PBS use.

It is well documented that people who perceive that a given behavior (e.g., using alcohol) would lead to a desired outcome (e.g., positive alcohol-related effects), are more likely to perform such behavior (Montes et al., 2017). Thus, it is expected that people who consume alcohol and perceive that using PBS would be effective in minimizing alcohol-related negative consequences would use them more frequently than would those who do not believe they are effective. Building upon this premise, four previous studies (Fairlie et al., 2021; Ray et al., 2009; Scaglione et al., 2015; Werch, 1990) have found a positive association between perceived efficacy of PBS and personal PBS use. However, these studies were all conducted with US university students, and only the study by Scaglione et al. (2015), which examined the effectiveness of PBS in reducing only one alcohol-related consequence (sexual-related risks), was prospectively designed.

Social norms may be considered one of the most important concepts in social sciences (Legros & Cislighi, 2020). In the field of alcohol use research, perceived descriptive norms are operationalized as how an individual perceives others' quantity and frequency of drinking alcohol (Borsari & Carey, 2001; 2003), and a vast accumulation of evidence has demonstrated that young adults overestimate peers' drinking, which relates to more personal alcohol use (Borsari & Carey, 2001, 2003; Borsari et al., 2007; Rinker & Neighbors, 2014). This overestimation may be related to the fact that personal alcohol use is then seen as less risky and, therefore, the re-evaluation of one's own drinking is less likely (Baer et al., 1991; Borsari & Carey, 2001), reducing the likelihood of decreasing personal alcohol use. As such, many interventions aimed at reducing excessive alcohol consumption have shown the effectiveness of correcting misperceptions about other's drinking (Legros & Cislighi, 2020). Prior research has shown that the potential of others' alcohol use influencing personal consumption differs according to the reference group examined (e.g., typical students, close friends). In particular, close friends appears to be the most influential reference group in determining personal alcohol use, meaning people tend to report similar alcohol consumption behaviors as their friends (Borsari & Carey, 2001; Krus et al., 2020; Stevens et al., 2021; Rinker & Neighbors, 2014).

Despite the solid evidence on the importance of descriptive norms for alcohol consumption behavior, the association between descriptive norms of PBS use of others (especially friends) and personal PBS use is understudied. To our knowledge, only two studies have analyzed this association. Using the "typical campus student" as the reference group, the findings of both studies supported the underestimation of peers' PBS use among college students, and the positive association of PBS descriptive norms with PBS personal use (Benton et al., 2008; Lewis et al., 2009).

However, these two studies were cross-sectional and conducted among U.S. college students, which limits their predictive utility (i.e., replicability of effects) and generalizability to other contexts and community-based samples not composed of only university students.

Descriptive norms may impact behaviors through multiple pathways, which can be both direct and indirect (Legros & Cislighi, 2020). In the direct pathway, other's behaviors serve as a model which is repeated, obtaining social reinforcements like social approval (Perkins, 1997). When descriptive norms influence behavior indirectly, behavior is mediated by various cognitive factors (Legros & Cislighi, 2020; Perkins, 1997), which include outcome expectancies. This is consistent with the tenets of Social Learning Theory in the field of alcohol use research (Abrams & Niaura, 1987; Maisto et al., 1999) which postulates that cognitive factors (e.g., perceived efficacy) mediate the impact of socioenvironmental factors (e.g., descriptive norms) on drinking behavior (Wood et al., 2001).

Various empirical findings support the mediating role of alcohol outcome expectancies (e.g., alcohol positive effects) between alcohol-related descriptive norms and alcohol consumption behavior (Botvin, 1997; Litt & Stock, 2011; Scheier & Wood et al., 2001). However, few studies have examined whether the perceived efficacy of PBS to reduce alcohol-related consequences (an outcome expectancy) mediate the relationship between descriptive norms of PBS use and personal PBS use. In a recent cross-sectional study conducted by Fairlie et al. (2021), a similar mediation model was examined with 301 college students, although they examined descriptive norms for reasons to use PBS of close friends instead of descriptive norms of PBS use. They found that the perceived usefulness of PBS (SHR, MOD, and SLD) mediated the association between descriptive norms for reasons to use PBS and personal PBS use.

The purpose of the present study was to examine explanatory factors of PBS use to inform interventions that intend to increase the use of these strategies among community young adults. The explanatory power of a theory or construct differs as a function of the type of behavior which is aimed to be explained. Thus, despite of the importance of descriptive norms and outcome expectancies has been proven for several behaviors (including alcohol use), its ability for explaining behaviors that are useful to minimize alcohol-related harms (i.e., PBS) has been understudied. The few studies that have examined these explanatory factors (i.e., descriptive norms and perceived efficacy of PBS use) in the field of PBS use were conducted with U.S. university students and, with the exception of Scaglione et al. (2015), were cross-sectionally designed. Moreover, although it is well established that close peers are the most influential group for alcohol-related behaviors (Stevens et al., 2021), these previous studies included the "typical campus student" as the reference group for measuring PBS descriptive norm. We therefore aimed to prospectively examine the associations between descriptive norms of close peers' PBS use and perceived efficacy of PBS use, with personal PBS use (SHR, MOD, SLD) in a community-based sample of Spanish young adults. Moreover, building upon the conceptual and empirical findings on the pathways in which perceived norms impact behavior, our second objective was to examine the mediating role of perceived efficacy of PBS to reduce alcohol-related consequences between descriptive norms of PBS use and personal PBS use. We hypothesized that both descriptive norms

and perceived efficacy of PBS would be positively associated with personal PBS use of participants. Given that norms may influence behaviors both directly and indirectly (Legros & Cislighi, 2020), we also hypothesized that perceived efficacy of PBS would mediate the relationship between descriptive norms of PBS and personal PBS use.

Method

Participants

Between September-December 2019, a targeted sampling procedure (Watters & Bernacki, 1989) was used to access a community-based sample of 360 young-adult who consume alcohol (Huelva, Spain) of whom 339 (92.2%) participated in a 2-month follow-up assessment, and made up the analytic sample in the present study (mean age=21.1 [$SD=2.21$], female=50.7%). Inclusion criteria: a) being 18-25 years old, b) reporting the use of alcohol on ≥ 2 occasions during the past month and c) agree to participate in a two-month follow-up. By interviewing accessible young adults who use alcohol, we drew up a list of potential settings (e.g., nightclubs, pubs, sport centers) across the city of Huelva in which eligible young adults were expected to be located. Each setting on the list was accompanied by an associated time slot at which settings were expected to be attended by young adults. Then, the selected venues were visited by a social psychologist, who approached potential participants that, in appearance, were 18-25 years old. Among those who met the age criterion and agreed to participate, a telephone call was made later to determine if they met the alcohol-related inclusion criteria. Through this procedure, 174 participants (48.3% of the analytic sample) were recruited. In coherence with targeted sampling procedure (Vervaeke et al., 2007; Watters & Biernacki, 1989), we used the social networks of the participants (snowball sampling, Goodman, 1961) to access an additional 155 participants (43.1%), establishing a maximum of five candidates to be nominated by each participant in order to maximize the sample heterogeneity. Additionally, 31 participants (8.6%) were recruited by means of recruitment posters presenting information about the study which were placed in the selected areas throughout the city.

To contact baseline participants and request for participation in the follow-up assessment, we used a mixed method procedure (Dillman et al., 2014), which has shown utility in achieving high response rates in survey research and in avoiding biases associated to non-response (Dillman et al., 2014, De Leeuw, 2018). WhatsApp pre-notifications (seven days before completion) and telephone calls (2-3 days before completion) were utilized to schedule the follow-up assessment. Moreover, two follow-up contacts (via WhatsApp and telephone call) were made with those participants who did not respond to previous contacts. Those who did not participate in the follow-up ($n=21$) did not differ from participants in terms of age, sex, frequency of PBS use), mean number of days of binge drinking in the last 2-months, or quantity of alcohol consumed during a typical week in the last month.

Instruments

We piloted the questionnaire on a convenience sample of 127 young adults who met inclusion criteria. They responded to an initial version of the questionnaire, and also to open-ended

questions about readability and survey length. After examining their responses, we changed the wording of some items, and their data were discarded from the analytic sample of the study. The final instrument included:

Sociodemographic characteristics (baseline): Sex, age, country of birth, and college status (whether or not the participant currently attends a university).

Self-reported consumption of alcohol and other substances (baseline and follow-up): Frequency of alcohol use in the past year, and number of days of alcohol use and binge drinking in the past two months. Binge drinking was defined for participants as “consuming ≥ 5 drinks (in men) or ≥ 4 drinks (in women) within a two-hour interval” (Courtney & Polich, 2009). A modified version of the Daily Drinking Questionnaire (DDQ, Collins et al., 1985) was used to assess the quantity of alcohol used in a typical week during the past two months. The number of drinks reportedly used by the participants was converted into Standard Drink Units (SDUs), considered equivalent to 10 grams of pure alcohol in Spain (Rodríguez-Martos et al., 1999).

At baseline and follow-up, we collected information about the use of six additional psychoactive substances during the past two months: cannabis, cocaine, ecstasy, amphetamines, magic mushrooms, and LSD. As evidence of validity, we also asked participants about the use of a fictitious drug (Nadropax), which has been used in previous research (Fernández-Calderón et al., 2018). None of the participants reported its use either at baseline or at follow-up.

Protective Behavioral Strategies (follow-up): The Protective Behavioral Strategies Scale (Treloar et al., 2015), in its Spanish version (S-PBSS-20, Sánchez-García et al., 2020) was used to assess the participants’ PBS use. The S-PBSS-20 asks about 20 PBS (MOD=5 items; SHR=8, SLD=7) in a Likert response scale (ranging from 1=*never* to 5=*always*). Participants were asked how frequently they had used each strategy when they used alcohol or partied during the past two months. Ordinal Cronbach’s Alpha were: MOD = .72, SLD = .72, SHR = .77.

Descriptive norms of peer’s PBS use (baseline). Similar to Lewis et al. (2009), we used a modified version of the PBSS to assess descriptive norms of PBS use among close peers. We asked participants “How often people with which you usually drink alcohol or party used the following behaviors in the past two months?” Response options ranged between 1=*never* to 5=*always*. Ordinal Cronbach’s alpha were: MOD = .80, SLD = .78, SHR = .83.

Perceived efficacy of PBS to reduce alcohol-related negative consequences (baseline). In accordance with Ray et al. (2009) and Fairlie et al. (2021), a modified version of PBSS was used to ask about the perceived efficacy of PBS to reduce alcohol-related negative consequences. In particular, the participants were asked: “Please, indicate how effective are each of the following behaviors in reducing alcohol-related negative consequences”. Response options were similar to those used in the study by Ray et al. (2009): 1=*not at all effective*, 2=*somewhat effective*, 3=*moderately effective*, 4=*extremely effective*. Ordinal Cronbach’s Alpha were: MOD = .76, SLD = .78, SHR = .84.

Alcohol-related negative consequences (baseline): The Spanish version (Pilatti et al., 2016) of the Young Adult Alcohol Consequences Questionnaire (YAACQ; Read et al., 2006), was administered to assess 48 alcohol-related negative consequences experienced over the last two months (answer format, 0=*no*, 1=*yes*).

In agreement with the recommendations of the original scale authors (Read et al., 2006), internal consistency was estimated by mean of tetrachoric correlations (Cronbach Alpha=.96).

Procedure

For baseline and follow-up assessments, participants completed a self-administered pencil-and-paper questionnaire in a room at the University of Huelva. All participants provided informed consent prior to completion and received a 15-euro Amazon voucher for participating. The Regional Committee for Bioethics Research of Andalusia (Regional Ministry of Health, Andalusia, Spain) approved the protocol for this research study.

Data analysis

Multiple hierarchical linear regressions were applied to test the prospective associations between baseline descriptive norms and perceived efficacy of PBS, and personal PBS use at follow-up. Three regression models were conducted, one for each PBS subscale (SHR, MOD, SLD) as the outcome variable. Age, gender, college status, alcohol-related consequences reported at baseline, and subscales of PBS for descriptive norm and efficacy that were not entered in the models as predictors were all estimated as covariates in the first step of all regression models. In Step 2, the following follow-up measures were included as covariates: mean days of alcohol use and binge drinking in the past 2-months, and typical quantity of alcohol consumed. Finally, the third step of each regression model included the corresponding subscale of descriptive norms and efficacy of PBS.

To test the potential mediating role of perceived efficacy of PBS between descriptive PBS norms and personal PBS use, the PROCESS macro (version 3.3, Hayes, 2017) for SPSS was used. This analysis adopts the non-parametric approach of bootstrapping to estimate total, direct and indirect effects in a mediation model. Three simple mediation models (5,000 bootstrap samples, confidence interval 95%) were computed, one for each PBS subscale as the outcome. The score of the corresponding PBS subscale for descriptive norms was used as the predictor, while perceived efficacy of the matching PBS subscale was use as the mediator. The same covariates used in the regression analyses were used in mediation analyses. The percentage of the total

effect of descriptive norms on personal PBS use that is mediated by perceived efficacy of PBS was calculated for each mediation model.

Results

Descriptive and bivariate analyses

Over a third of participants (35.1%) reported using alcohol three or less days per month during the past year, 25.1% reported weekly use, and 39.8% used two or more days per week. At baseline, the mean number of days of alcohol use and binge drinking in the past two months was 15.8 (SD = 11.5) and 5.8 (SD = 8.0), respectively. At follow-up these means were, 12.4 (SD = 9.8) and 4.0 (SD = 5.4).

None of the participants reported past two months use of amphetamines, magic mushrooms, or LSD, at baseline or at follow-up. Cannabis use in the past two months was reported by 37.8% of participants at baseline (mean number of days used = 14.40, SD=20.81) and 34.2% at follow-up (M = 18.40, SD=22.16). Cocaine was reportedly used by 2.3% at baseline (M = 4.63, SD = 6.35) and 1.5% at follow-up (M = 5.80, SD = 8.01); and ecstasy use was reported by 3.5% at baseline (M = 3.75, SD = 4.18) and 2.4% at follow-up (M = 1.63, SD = 1.06).

As shown in Table 1, for each PBS subscale, on average, participants perceived that their PBS use was higher than their peers' use (MOD, $t_{(334)} = -9.85, p < 0.001$; SHR, $t_{(336)} = -9.53, p < 0.001$; SLD, $t_{(332)} = -3.53, p < 0.001$). In comparison to MOD and SLD, both perceived use and efficacy of SHR strategies, was around double, as it was the use of SHR strategies in comparison to the use of MOD and SLD strategies. The Pearson correlations between all variables was significant (in most cases, $p < .001$).

Regression analyses

In all three models, after controlling for covariates, increases in descriptive norms and efficacy of the corresponding PBS subscale at baseline was associated with increased personal PBS use at follow-up (Table 2). The model with SHR strategies was more explanatory (49.8% variance explained) than the models with MOD (35.2%) and SLD (33.8%). Considering semi-partial correlations, in the regression models for MOD and SHR the explained variance of

Table 1
Descriptive statistics and correlations between perceived efficacy, descriptive norms, and protective behavioral strategies

Variable	M	SD	1	2	3	4	5	6	7	8	9
1. Descriptive norm-MOD-B	14.05	3.97	1								
2. Descriptive norm-SHR-B	30.20	5.75	.59***	1							
3. Descriptive norm-SLD-B	16.55	4.61	.62***	.51***	1						
4. Perceived efficacy-MOD-B	16.36	2.61	.17**	.18**	.10	1					
5. Perceived efficacy-SHR-B	28.45	3.42	.23***	.49***	.20***	.42***	1				
6. Perceived efficacy-SLD-B	19.46	4.13	.12*	.20***	.32***	.51***	.43***	1			
7. MOD-FU	16.44	3.98	.38***	.29***	.17**	.27***	.16**	.13*	1		
8. SHR-FU	32.83	5.08	.26***	.56***	.24***	.20***	.46***	.20***	.43***	1	
9. SLD-FU	17.56	5.03	.28***	.24***	.40***	.26***	.26***	.43***	.43***	.37***	1

Note: ***p<.001, **p<.01, *p<.05.

Range for descriptive norms and PBS use=1-5; perceived efficacy=1-4

B=Baseline; FU=Follow-up; SHR=Serious Harm Reduction; SLD=Stopping /Limiting Drinking; MOD=Manner of Drinking

Table 2

Hierarchical linear regressions predicting protective behavioral strategies from perceived efficacy and perceived descriptive norm

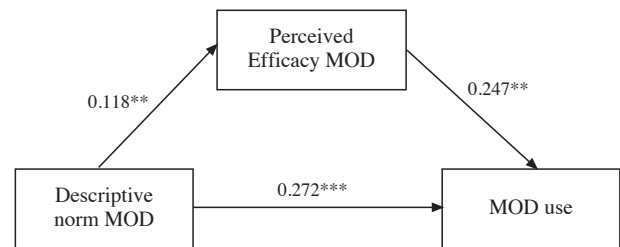
Outcomes and predictors	B (95% CI)	β	p	Sr^2	ΔR^2
PBS-MOD at follow-up					
Step 1					.190***
Sex	-.33 (-1.11, .44)	-.04	.400	.001	
Age	.12 (-.04, .29)	.07	.151	.004	
College status	-.41 (-1.18, .35)	-.05	.291	.002	
Descriptive Norm-SHR-B	.06 (-.03, .16)	.09	.175	.004	
Descriptive Norm-SLD-B	-.10 (-.21, .01)	-.12	.075	.007	
Perceived efficacy-SHR-B	-.05 (-.20, .09)	-.05	.446	.001	
Perceived efficacy-SLD-B	-.01 (-.11, .12)	.01	.885	.000	
YAACQ total-B	-.06 (-.11, .00)	-.11	.038	.009	
Step 2					.105***
Alcohol use frequency-FU	.11 (-.04, .06)	.03	.654	.000	
Binge drinking frequency-FU	-.12 (-.21, -.02)	-.16	.015	.012	
Alcohol quantity-FU	-.06 (-.10, -.03)	-.22	<.001	.026	
Step 3					.057***
Descriptive Norm-MOD-B	.27 (.14, .41)	.27	<.001	.033	
Perceived efficacy-MOD-B	.25 (.07, .42)	.16	.007	.015	
PBS-SHR at follow-up					
Step 1					.267***
Sex	1.45 (.57, 2.33)	.14	.001	.017	
Age	-.05 (-.24, .14)	-.02	.607	.000	
College status	.24 (-.63, 1.10)	.02	.590	.000	
Descriptive Norm-MOD-B	-.09 (-.24, .06)	-.07	.264	.002	
Descriptive Norm-SLD-B	-.01 (-.13, .12)	-.01	.920	.000	
Perceived efficacy-MOD-B	.05 (-.15, .26)	.03	.594	.000	
Perceived efficacy-SLD-B	-.03 (-.16, .09)	-.03	.607	.000	
YAACQ total-B	-.03 (-.09, .03)	-.04	.337	.001	
Step 2					.094***
Alcohol use frequency-FU	-.07 (-.12, -.02)	-.14	.008	.011	
Binge drinking frequency-FU	-.08 (-.19, .02)	-.09	.113	.004	
Alcohol quantity-FU	-.04 (-.08, -0.04)	-.12	.030	.008	
Step 3					.137***
Descriptive Norm-SHR-B	.38 (.28, .49)	.43	.000	.082	
Perceived efficacy-SHR-B	.22 (.06, .38)	.15	.007	.012	
PBS-SLD at follow-up					
Step 1					.174***
Sex	-.33 (-1.31, .66)	-.03	.512	.001	
Age	.10 (-.12, .31)	.04	.386	.002	
College status	-.64 (-1.62, .33)	-.06	.194	.004	
Descriptive Norm-MOD-B	.02 (-.15, .19)	.01	.835	.000	
Descriptive Norm-SHR-B	-.02 (-.14, .10)	-.02	.754	.000	
Perceived efficacy-MOD-B	.01 (-.21, .24)	.01	.912	.000	
Perceived efficacy-SHR-B	.12 (-.06, .31)	.08	.175	.004	
YAACQ total-B	.04 (-.11, .02)	-.07	.217	.003	
Step 2					.036**
Alcohol use frequency-FU	.03 (-.03, .09)	.05	.386	.002	
Binge drinking frequency-FU	-.08 (-.20, .03)	-.09	.169	.004	
Alcohol quantity-FU	-.05 (-.10, -.01)	-.15	.020	.012	
Step 3					.128***
Descriptive Norm-SLD-B	.28 (.14, .42)	.26	<.001	.032	
Perceived efficacy-SLD-B	.35 (.21, .49)	.29	<.001	.050	

Note: The values of the final step of the regressions are presented. College status=being [1] or not [0] studying at university. Male=0, female=1
 ** p<.01. *** p<.001. B=Baseline; FU=Follow-up; SHR=Serious Harm Reduction; SLD=Stopping /Limiting Drinking; MOD=Manner of Drinking

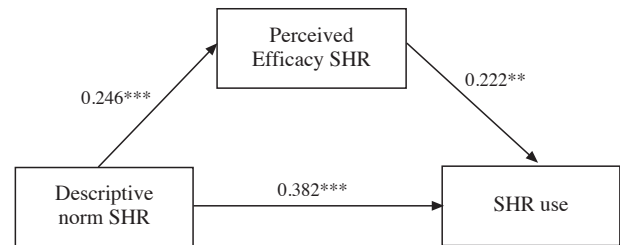
descriptive norms on personal PBS use was higher in comparison to perceived efficacy. Inverse associations were detected in the model with SLD use as the outcome variable (Sr^2 for descriptive norm = .032, Sr^2 for perceived efficacy = .050).

Mediation analyses

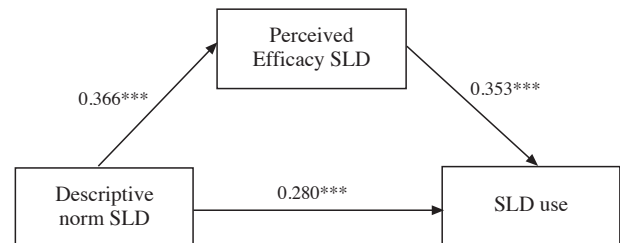
The diagrams and non-standardized effects of single mediation models are presented in Figure 1. Perceived efficacy of PBS use to reduce alcohol-related consequences partially mediated the association between descriptive norms and personal PBS use in the three models. The percentage of the total effect of descriptive



Total effect=0.301
 Indirect effect=0.029 (CI=0.004-0.066)
 Percentage of the total effect of perceived MOD norm on personal MOD use that is mediated by perceived efficacy of MOD=9.63%



Total effect = 0.436
 Indirect effect =0.055 (CI=.015-.108)
 Percentage of the total effect of perceived SHR norm on personal SHR use that is mediated by perceived efficacy of SHR = 12.61%



Total effect=0.410
 Indirect effect=0.129 (CI=.069-.19)
 Percentage of the total effect of descriptive SLD norm on personal SLD use that is mediated by perceived efficacy of SLD=31.54%

Figure 1. Mediation models for Protective Behavioral Subscales (MOD, SHR, and SLD)

norm on personal PBS use mediated by perceived efficacy was higher in the model with SLD as the outcome variable (31.5%) in comparison to the models with MOD (9.6%) and SHR (12.6%) as the outcome variables.

Discussion

Although a long tradition of studies has shown the importance of descriptive norms and outcome expectancies as explanatory factors of alcohol consumption behavior, studies examining the impact of these two factors on alcohol PBS use are limited. To our knowledge, this is the first study that prospectively examines the relationships between these two cognitive factors and PBS use in community young adults. We also believe this is the first study that tested the mediating role of perceived efficacy in the relationship between descriptive norms of close peers' PBS use and personal PBS use. In support of our hypotheses, both perceived efficacy and descriptive norms at baseline were positively associated with personal PBS use at follow-up. This result was replicated for each of the PBS subscales, MOD, SHR, and SLD. Moreover, as expected, a partial mediation effect of perceived efficacy between descriptive norms and PBS use was found for the three PBS subscales.

Our findings are in line with health behavior theories (e.g., protection motivation theory, social cognitive theory) and the empirical evidence that addresses outcome expectancies as a main determinant of health-related behaviors (Rogers, 1983; Ruiter et al., 2014). Results are also consistent with the findings of prior research conducted with university students, which found a positive relationship between PBS perceived efficacy and PBS use (Fairlei et al., 2021; Ray et al., 2009; Scaglione et al., 2015; Werch, 1990). Similar to results by Fairlei et al. (2020), we found that these positive relationships held across the three typical types of PBS. Thus, in light of our results, interventions promoting PBS use should focus on increasing the perceived efficacy of PBS to reduce alcohol-related negative consequences. Considering the relative contribution of perceived efficacy in terms of explained variance for the three types of PBS strategies, our findings suggest that, in comparison to MOD and SHR strategies, the promotion of SLD strategies could benefit the most from the interventions aimed at increasing the perceived efficacy of PBS.

In accordance with the two previous studies examining descriptive PBS norms and personal PBS use (Benton, 2008; Lewis et al., 2009), participants in our sample overestimated their PBS use in comparison to their peers' use, and increased descriptive norm was related to increased PBS use. However, our study may expand previous findings in three ways. First, unlike previous studies discussed, our study was prospectively designed, and leads to increased confidence in the predictive value of descriptive PBS norms regarding personal PBS use. Further and in contrast to previous studies that used "the typical student in your campus" as the normative reference group, we focused on close peers, which have shown to be the most influential group in determining alcohol-related behaviors. Finally, our findings were obtained from a community sample of Spanish young adults that was not limited to college students, and this helps contribute to the external validity of the relationships between normative perceptions and PBS use.

Similar to previous research, our findings show that SHR strategies are: a) the most used PBS (Pearson, Kite, & Henson, 2013; Sánchez et al., 2020), b) those for which descriptive norms

of use is highest (Lewis et al., 2009), and c) the type of PBS that are perceived as most useful to reduce alcohol-related negative consequences (Fairlei et al., 2021). Moreover, the relative explained variance of SHR descriptive norms over the use of SHR strategies (8.2%) is fairly superior to the explained variance of descriptive norms in the models with MOD (3.3%) and SLD (3.2%). This is consistent with the nature of SHR strategies, which are highly interconnected to others' behaviors (e.g., using a designated driver, going home with a friend, going out only with known and trusted people). Thus, in contrast to the potential of SLD strategies for the promotion of SLD efficacy, our results suggest that those interventions aimed at promoting PBS descriptive norms should consider a higher impact of SHR norms on SHR use.

Compared to SHR and SLD strategies, MOD strategies have consistently shown the strongest relationships with decreased alcohol use and consequences (García et al., 2018; Napper et al., 2014). In addition, previous interventions (e.g., Edwards et al., 2020; Terlecki et al., 2021) have shown that MOD strategies are superior to SHR and SLD in reducing alcohol use and its consequences. It is noteworthy that, in our sample, MOD strategies are used the least, are perceived as the less effective and, are the strategies for which descriptive norm is lowest. These findings suggest the need to increase efforts in promoting use of MOD strategies among alcohol-using young adults.

Our results are in line with the theoretical expectations (Abrams & Niaura, 1987; Maisto et al., 1999) and the empirical evidence (Litt & Stock, 2011; Scheier & Botvin, 1997; Wood et al., 2001) that suggest the existence of cognitive mediational processes between the effect of norms on drinking behavior. Simply stated, the mediating role of PBS perceived efficacy between PBS use descriptive norms and personal PBS use found in our study, could be expressed as: if my peers use PBS, then these strategies are probably effective at reducing alcohol-related negative consequences and, therefore, I will also use them. It should be noted that, in our study, the partial mediation effect of perceived efficacy was replicated across the three measures of PBS. This can be taken as evidence of external validity of our findings, that is, evidence that the validity of the proposed explanatory model may be extrapolated to PBS different in nature.

Our results show that, for the three types of PBS, the direct effect of descriptive norms on PBS use was larger than its mediated effect through perceived efficacy, highlighting the potential for normative perceptions as a mechanism of PBS change. However, the percentage of the total effect of PBS descriptive norms on PBS personal use mediated by perceived efficacy was much higher in the model with SLD, than in the models with MOD and SHR. This result suggests that those normative interventions aimed at increasing PBS use should consider the potential contribution of emphasizing the perceived efficacy of SHR strategies.

Although our hypotheses were tested for the three typical PBS subscales (MOD, SHR, and SLD), it is possible that specific PBS could be perceived as more useful and normative as a function of drinking contexts and alcohol consequences that are intended to be avoided or minimized. To overcome this limitation, future studies could benefit from using ecological momentary assessment (Phillips et al., 2018), also exploring the association between specific PBS and consequences.

It has been shown that some people who consume alcohol consider that PBS could be a barrier in experiencing the positive effects of alcohol intoxication (Bravo et al., 2018). While we

explored the positive outcome expectancies of using PBS (i.e., their potential to reduce alcohol-related negative consequences), we did not measure the negative expectations of using them and this could be a promising factor in establishing explanatory models of PBS use and the designing of effective interventions that promote their use. Although our findings support a double pathway (direct and indirect) from norm to action, other factors have been shown to impact PBS use (e.g., drinking motives, self-regulation; Bravo et al., 2015, 2016). Future studies should aim to replicate our findings and should also test explanatory models that take into account other relevant factors in the field of alcohol research. Finally, descriptive norms are understood as a passive mechanism of influence on drinking behavior, but the importance of active social influence (e.g., offers from peers to drink alcohol) has been well documented (Wood et al., 2001). Future research should consider the possible impact of being pressured to not use PBS, since this type of active influence would need for a training in skills to manage peer pressure.

The importance of descriptive norms and outcome expectancies in the field of health-related behaviors is well established. Our study contributes to this field by showing their explanatory power when they are applied to the use of PBS, a topic barely studied. The strengths of the present research also include its prospective design and the use of a community sample of young adults. After an exhaustive control of covariates, our results highlight the utility of both descriptive norm and perceived efficacy for predicting PBS use. Our findings also suggest that descriptive norms of PBS use may influence personal PBS use both directly and indirectly via perceived efficacy. In recent years, a growing number of interventions have included PBS as a mean of reducing alcohol use and its negative consequences. Some studies showed the effectiveness of standalone PBS-based interventions to increase PBS use and reduce alcohol use and its potential negative consequences

(Edwards et al., 2020; Kenney et al., 2014). However, other studies did not find an impact of these interventions on alcohol outcomes (e.g., Labrie et al., 2015; Martens et al., 2013). Moreover, although ample evidence supports the efficacy of personalized feedback interventions (PFI) that correct misperceptions of alcohol use by peers, it has been shown that their efficacy increases when PBS are included as a component of these interventions (Miller et al., 2013). However, very few interventions have included the PBS normative perception. A recent group of studies (Dvorak et al., 2015; 2016; 2018) has shown the utility of considering PBS descriptive norms as part of Deviance Regulation Theory interventions aimed at increasing PBS use and reducing alcohol use and its negative consequences. However, to our knowledge, no previous interventions have focused on correcting misperceptions of PBS use by peers, which could be conducted within the framework of PFI. Our findings suggest that this type of intervention could be useful in community young adults that use alcohol. Our findings also suggest the inclusion of PBS perceived efficacy as a component of these interventions. Finally, it is possible that these interventions could benefit from challenging the negative expectancies of using PBS, this is, the expectancies that PBS use could reduce positive alcohol-related effects.

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