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Examining the Efficacy of a Personalized Normative Feedback Intervention to Reduce College Student Gambling

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Abstract

Objective—To evaluate the efficacy of a stand-alone personalized normative feedback (PNF) intervention targeting misperceptions of gambling among college students.

Participants—Undergraduates (N=136; 55% male) who reported gambling in the past 30 days were recruited between September 2011 and March 2012.

Methods—Using a randomized clinical trial design, participants were assigned to receive either PNF or an attention control task. In addition to self-report, this study used two computer-based risk tasks framed as “gambling opportunities” to assess cognitive and behavioral change at one week post intervention.

Results—After one week, participants receiving PNF showed a marked decrease in perception of other students’ gambling, and evinced lower risk-taking performance on two analog measures of gambling.

Conclusions—Changes in both self-reported perceived norms and analog gambling behavior suggest that a single, stand-alone PNF intervention may modify gambling among college students. Whether it can impact gambling outside of the lab remains untested.

Keywords

brief intervention; college; gambling; personalized normative feedback; risk; social norms

Personalized normative feedback is a brief intervention that elicits behavior change by targeting and correcting misperceptions of “normal” or “typical” behavior ¹. In theory, normative feedback works by developing a salient discrepancy between perceived and actual norms, thereby providing an accurate context in which the individual can evaluate his or her behavior ². The efficacy of this approach is best illustrated by efforts to reduce heavy drinking among college students. The finding that college students overestimate drinking behavior among their normative cohort is robust ^{3, 4}. Personalized normative feedback as a stand-alone intervention has been associated with reductions in drinking ⁵, with evidence suggesting that the observed effects are mediated by changes in perceived norms ⁶⁻⁸.

A parallel line of research has demonstrated that college students evince similar misperceptions – specifically overestimation – with regard to gambling among their peers, and these misperceptions are associated with increased gambling frequency, expenditure,

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and related problems⁹⁻¹¹. Researchers recommend integrating personalized normative feedback into campus-based gambling prevention and intervention strategies¹²⁻¹⁴. One study has illustrated the efficacy of a larger motivational intervention incorporating personalized normative feedback for gambling¹⁵. The current study examines the efficacy of a personalized normative feedback as a stand-alone intervention targeting misperceptions of gambling among college students.

Gambling Among College Students

With the proliferation of casinos, online gambling sites, lotteries, and other gaming opportunities, disordered gambling is an emergent public health concern in the United States¹⁶. In general, disordered gambling is associated with a variety of serious problems ranging from financial to psychological, interpersonal, occupational, and legal¹⁷. College students represent a population of special interest in the gambling literature. Approximately 75% of US college students have gambled within the past year¹⁸. While this participation rate is comparable to that of the general adult population¹⁹, the lifetime prevalence rates of disordered gambling among college students are more than double those of adults, with roughly 5% meeting criteria for pathological gambling and 9% evincing problematic but subclinical gambling²⁰.

Theories pertaining to the development and maintenance of problematic gambling among college students have benefited from extensive research on high-risk, impulsive behaviors (e.g., alcohol and substance use, unprotected sex) in a broader yet applicable population – adolescents. In humans and non-human species alike, adolescence is a phase characterized by a high level of risk-taking that is likely related to maturational processes of the brain²¹⁻²³. Nonetheless, while neurodevelopmental theories help to explain the observed propensity toward general risk-taking during adolescence, it is important to consider how environmental and interpersonal factors influence engagement in *specific* risk behaviors.

Common risk factors for behaviors such as gambling, substance use, and delinquency include but are not limited to sociodemographic factors (e.g., race and socioeconomic status), individual factors (e.g., impulsivity and sensation seeking), and parent-child relations^{24, 25}. Above and beyond common risk factors, it has been suggested that accessibility and perceived social acceptance directly influence the emergence of gambling²⁶. Specifically, it has been posited that the likelihood of gambling increases with the number of available gambling opportunities, and with the increased perception that family and peers are engaged in gambling. This latter hypothesis is supported by findings that identify socialization as one of the most frequently reported motives for gambling among college students^{27, 28}.

Personalized Normative Feedback for College Student Gambling

Given the demonstrated co-occurrence between problematic gambling and alcohol abuse, and the theoretical conception of both as part of a more general “externalizing syndrome”²⁵, it is likely that similar processes underlay the two behaviors^{29, 30}. Furthermore, evidence suggests that effective treatments for disordered gambling share common elements with effective alcohol interventions¹⁷. If stand-alone interventions targeting misperceptions of drinking norms elicit reductions in alcohol consumption among college students, one should predict that the same intervention would result in reductions in gambling.

The purpose of the current study was to evaluate the efficacy of a personalized normative feedback intervention designed to target and correct misperceptions of gambling among college students. Following the model generated within the alcohol literature, the current study selectively used descriptive norms related to frequency and quantity of gambling.

“Typical college students who gamble” were used as the normative reference group. It was hypothesized that participants would overestimate the frequency and quantity of gambling among this reference group, and that these misperceptions would be positively correlated with participants’ self-reported gambling. In contrast to previous studies of personalized normative feedback that relied solely on retrospective self-report^{5, 8, 15}, the current study measured behavior change more directly by using computer-based measures of risk framed as “gambling opportunities.” It was hypothesized that misperceptions of gambling norms would be positively correlated with the quality (i.e., level of risk) and quantity (i.e., expenditure) of gambling, as indexed by performance on these tasks. Finally, with regard to the effect of personalized normative feedback, it was hypothesized that, compared with the control group, individuals who received the intervention would report decreased perceived descriptive norms and evince lower levels of risk-taking and expenditure on the two analog gambling tasks.

Method

Participants

Across two consecutive semesters, screening questionnaires were completed by 481 students enrolled in introductory psychology courses at a medium-size state university. Demographics, contact information, and frequency of gambling data were collected. The screening sample was predominantly females (65%), with a mean age of 19 (range: 17 to 34). Students who reported participation in at least one gambling activity (e.g., card gambling, skill games, sports gambling, etc.) during the past 30 days were eligible to participate. Of 481 individuals screened, 200 (42%) individuals met this eligibility criterion. All eligible individuals were contacted by phone, and 144 volunteered to participate and went on to complete the first of two experimental sessions. One hundred thirty-six (94%) completed both sessions, and thus comprised the sample for all subsequent analyses.

Procedure

Prior to the first experimental session, each individual was randomly assigned to one of two conditions: the *personalized normative feedback* condition (subsequently labeled “PNF”) or the *attention control* condition (subsequently labeled “Control”). At the start of the first session, all potential participants were informed that the purpose of the study was to evaluate the utility of laboratory-based measures of gambling; they were not informed about the experimental manipulation until they had completed the entire two-session protocol. Next, participants completed several computer-based questionnaires, including measures of the participant's gambling and his or her perception of the gambling activity of the “typical student who gambles.” After completing the survey, each participant undertook two tasks framed as “gambling opportunities” (listed below under “behavioral measures”). Once the participant completed all baseline measures, the experimental manipulation was administered.

Personalized normative feedback—The format of the personalized normative feedback intervention was modeled after the normative feedback component of the Brief Alcohol Screening and Intervention of College Students program (BASICS)³¹. Specifically, this included a summary of the participant's perceived descriptive norms regarding gambling frequency, amount of money lost per year, and maximum amount of money lost in one day, compared with actual norms from a sample of student gamblers and a summary of the participant's own gambling. In addition, participants were informed of their percentile rank comparing their gambling with other students’ gambling. Actual descriptive norms were generated from data that our lab had collected from 284 completed surveys during the previous year. In sum, the feedback communicated the following messages: 1) this is how

much you gamble; 2) this is how much you think the “typical student who gambles” gambles; and 3) this is how much the “typical student who gambles” actually gambles. This information was provided on the same computer used to complete the self-report and behavioral measures.

Attention control—In order to determine whether the observed results were related to the content of the personalized normative feedback and not simply due to additional attention, the current study employed an attention-placebo control group. Participants assigned to the Control group were presented with facts about students at the university. The format mirrored the text-based and graphic content of the personalized normative feedback. However, the information was neither directly related to gambling, nor did it involve personalized content. For example, students were informed that X% of students participate in intramural sports and Y% of students have a part-time job during the school year.

After the manipulation phase was complete, the behavioral measures were administered again. Completion of this immediate follow-up marked the end of the first experimental session. The second session, scheduled one week later, involved a follow-up assessment comprising several of the same measures administered at baseline. When the participant arrived for the second session, he or she was asked to complete a readministration of several computer-based self-report measures (including those that address the participant's gambling and their perceptions of other students' gambling). Once the participant completed the follow-up survey, he or she completed a final readministration of the two analog measures of gambling. After the behavioral measures were completed, the participant was interviewed and debriefed. All procedures were approved by the university IRB.

Behavioral Measures

The Balloon Analogue Risk Task (BART)³² is a computer-based measure of behavioral risk-taking, and performance on this task is reported to be positively associated with gambling³³. Participants are presented with a series of virtual balloons and informed that they will receive a pre-determined amount of money each time they press the “pump” button until they decide to “collect.” Participants are also informed that pumping the balloon past an unknown threshold (which varies from trial to trial) will cause the balloon to pop, resulting in the loss of money accrued during that trial. For the purpose of the current study, the task consisted of 30 trials. The adjusted average number of pumps per trial (i.e., the average number of pumps on trials in which the balloon did not pop) was used as the dependent variable of interest.

In order to frame the task as a “gambling opportunity,” the virtual money accrued was assigned a real-life value, in that the money would be used to buy tickets toward a raffle, with more tickets increasing a participant's likelihood of winning real prizes ranging from a \$10 gift card to a \$150 mp3 player. A similar raffle incentive system has been used in previous investigations to model gambling in a laboratory setting³⁴. Overall the task included opportunities to win (i.e., successful trials) and to lose (i.e., balloon explosions) something of value, thereby providing a compelling analog of gambling.

The Pick-A-Card task (PAC) was used as a second analog measure of gambling. The PAC was designed by the experimenter (MC), and results from an unpublished pilot study revealed that performance on the PAC is associated with self-reported gambling as well as with performance on the BART. The strengths of the task include: 1) graphic and interactive elements (e.g., poker chips, playing cards, etc.) that closely resemble real gambling stimuli; 2) simplicity, in that participants may vary their risk-taking at will without requiring prior knowledge of complex gambling activities; 3) a direct model of gambling, with the opportunity to win or lose something of value and, unlike the BART, the potential for one to

end the task with less money than the amount possessed at the outset; 4) opportunity for the experimenter to evaluate risk across all 40 trials, rather than just a subset of trials (which is a documented weakness of the BART³⁵); and 5) a means for the experimenter to set a fixed schedule of wins and losses.

Within this computer-based task, the participant's goal is to “find the red queen” among a number of cards presented on the screen. A finite amount of virtual money (\$125.00) is provided to the participant, which he or she uses to place wagers on each of 40 individual trials. The participant is given the option to select from two, three, or five cards, and the option to wager \$0.25, \$1.00, \$5.00, or \$10.00 on a given trial. The participant can increase or decrease the risk level from trial to trial by changing the number of cards on the screen and/or the size of the wager. The data gathered within the task is used to compute a quantitative measure of risk termed the *risk coefficient*. Thus, for each individual trial, the risk coefficient = $(A \times B) / C$; where A = amount wagered on an individual trial, B = the probability of losing on that trial, and C = the total amount available when the wager was placed. The risk coefficient ranges from 0 to 1, with a larger value indicating greater risk. The test includes three practice trials to allow the participant to learn how to manipulate the functions of the task. The virtual money accrued during this task was assigned a real-life value using the same raffle paradigm described above. For the purpose of the current project, the average risk coefficient across all 40 trials and the total amount of money wagered (i.e., expenditure) were used as the dependent variables of interest.

Self-report Measures

During the screening phase, potential participants were asked to rate the frequency of their participation for 13 different gambling activities. To determine eligibility, we included one additional question at the end of this section, asking “have you participated in any of the above in the past 30 days?”

Data for the personalized normative feedback intervention were obtained using a six-item scale modeled after the Gambling Quantity and Perceived Norms scale³⁶. Three items assessed the participant's gambling frequency, annual expenditure, and maximum single-day loss, and three corresponding items assessed the participant's perception of these same characteristics for the “typical student who gambles.” Frequency items were scored on an 11-point scale with 1 indicating “never” and 11 indicating “every day.” Annual expenditure and maximum single-day loss items are scored on a 10-point scale with 1 indicating “less than \$25” and 10 indicating “\$2000 or more.” These six items were administered at baseline and at one-week follow-up.

Statistical Analyses

All self-report measures were assessed for completeness at the time of each experimental session. Descriptive statistics and graphics were used to evaluate variables of interest. The distributions for self-reported annual expenditure and maximum single-day loss were moderately and positively skewed; therefore, a log10 transformation was employed. After these transformations, all variables of interest met the assumptions for parametric statistics. Independent samples *t*-tests were used to compare the two experimental groups in terms of demographics and other baseline variables. Chi Square analysis was used to compare groups in terms of gender (coded dichotomously).

As previously indicated, the actual norms used in the current study were based on data collected in the previous year from the same subject pool. Independent-samples *t*-tests were used to determine whether individuals in the current sample significantly overestimated these norms for gambling frequency, annual expenditure, and maximum single-day loss. In

addition, paired-samples *t*-tests were used to compare participants' perceived norms to the self-reported gambling frequency, annual expenditure, and maximum single-day loss among participants in the current sample. Cohen's *d* was calculated as a measure of effect size for all *t*-tests.

Bivariate correlation analysis was used to evaluate the associations between participants' perceptions of others' gambling, their own self-reported gambling, and their performance on the analog measures of gambling at baseline. Finally, one-way repeated measures ANOVA was used to examine the effect of the intervention on perception of gambling norms and on the behavioral outcome variables (i.e., adjusted average pumps per trial from the BART, and the risk coefficient and total money wagered from the PAC task). This allowed us to assess the main effect of experimental group, the main effect of time, and the interaction between group and time. Eta squared (η^2) was used as a measure of effect size for all *F*-tests. Consistent with previous studies of college student gambling³⁶, disposable monthly income was explored as a covariate of interest. Analysis of baseline and follow-up data showed that amount of disposable income was not significantly associated with perceived gambling norms or with performance on the analog gambling tasks, therefore disposable income was not included in subsequent analyses. Finally, in light of previous findings demonstrating gender differences in college student gambling with men reporting more gambling and associated problems¹⁸, gender was included as a between-subjects factor in all repeated measures ANOVAs. This allowed for evaluation of the main effect of gender, the two-way interactions between gender and condition as well as gender and time, and the three-way interaction between gender, condition, and time.

Results

Demographics and Baseline Characteristics

The sample of 136 participants was predominantly male (55%), and had a mean age of 19 years (*SD* = 1.35; range: 18-30). At the group level, 68 participants were assigned to the PNF condition and 68 were assigned to the Control condition. Summary statistics for baseline variables of interest are presented in Table 1. The PNF and Control groups did not differ with regard to age, $t(134) = 0.13$, $p = .90$, or gender, $\chi^2(1) = 0.27$, $p = .61$. With regard to self-reported gambling, the experimental groups were comparable on frequency, $t(134) = 0.74$, $p = .46$, annual expenditure, $t(134) = 0.22$, $p = .83$, and maximum single-day loss, $t(134) = 1.38$, $p = .17$. In addition, the groups did not differ in terms of their baseline perception of gambling for the "typical student who gambles," with comparable ratings for perceived frequency, $t(134) = 1.76$, $p = .08$, perceived annual expenditure, $t(134) = 1.15$, $p = .25$, and perceived maximum single-day loss, $t(134) = 0.76$, $p = .45$. Finally, evaluation of baseline BART and PAC task data demonstrated that the two groups were similar across all indices of analog gambling behavior. Specifically, individuals in the PNF and Control groups evinced comparable adjusted pumps per trial on the BART, $t(134) = 0.48$, $p = .64$. In addition, the groups showed similar performance on the PAC task, as measured by the risk coefficient, $t(134) = 0.93$, $p = .36$, and total expenditure, $t(134) = 0.11$, $p = .91$.

Perceived Gambling Norms

It was hypothesized that participants would overestimate the frequency and quantity of gambling among "the typical students who gamble." Results of a series of independent-samples *t*-tests demonstrated that participants' baseline perception of gambling norms were significantly higher than the actual norms generated from a previous sample of student gamblers with regard to frequency, $t(418) = 9.25$, $p < .001$, $d = 0.95$, annual expenditure, $t(418) = 16.91$, $p < .001$, $d = 1.77$, and maximum single-day loss, $t(418) = 19.78$, $p < .001$, $d = 2.07$. The same pattern of results was observed using a series of paired-samples *t*-tests to

compare participants' perceived gambling to their own self-reported frequency, $t(135) = 4.43, p < .001, d = 0.38$, annual expenditure, $t(135) = 11.91, p < .001, d = 1.03$, and maximum single-day loss, $t(135) = 14.83, p < .001, d = 1.27$. A series of independent-sample t -tests demonstrated that self-reported gambling for the current sample was significantly higher than the actual norms generated from a previous sample of student gamblers with regard to frequency, $t(418) = 3.68, p < .001, d = 0.36$, annual expenditure, $t(418) = 2.92, p = .004, d = 0.31$, and maximum single-day loss, $t(412) = 2.82, p = .005, d = 0.30$. The means and standard deviations for these analyses are presented in Table 2.

Furthermore, it was hypothesized that participants' perceived gambling norms would be positively correlated with their self-reported gambling, as well as with baseline performance on the BART and PAC tasks. The results of a bivariate correlational analysis support the hypothesized relationship between perceived gambling norms and self-reported gambling, with significant and positive associations between self-reported and perceived gambling frequency, $r = .26, p = .002$, self-reported and perceived annual expenditure, $r = .19, p = .03$, and self-reported and perceived maximum single-day loss, $r = .27, p = .001$. The hypothesized relationships were not observed between perceived gambling norms and BART adjusted average pumps, PAC risk coefficient, or PAC expenditure. A consistent pattern of non-significant associations was observed between participants' self-reported gambling and the performance indices of the BART and PAC tasks. Other correlations of interest include the statistically significant positive association between BART performance and the PAC task risk indices (i.e., the risk coefficient, $r = .20, p = .02$, and total expenditure, $r = .18, p = .03$).

Pre-Intervention Risk-Taking

Supplemental analyses of baseline behavioral task performance suggest that risk taking increased over time (i.e., within the baseline administration) on both the BART and PAC tasks. When the 30-trial administration of the BART was broken down into three consecutive 10-trial segments, repeated measures ANOVAs showed a significant main effect of time on adjusted pumps per trial, $F(2, 270) = 39.77, p < .001, \eta^2 = 0.29$, with the number of pumps per trial increasing over time. When the 40-trial administration of the BART was broken down into four consecutive 10-trial segments, repeated measures ANOVAs showed a significant main effect of time on the risk coefficient, $F(3, 405) = 10.19, p < .001, \eta^2 = 0.08$, with participants showing greater risk over time. A significant main effect of time was also observed for total expenditure, $F(3, 405) = 2.91, p = .03, \eta^2 = 0.02$, with participants wagering more money over time. Despite the increase in risk-taking over time, correlation analysis examining the association between self-reported gambling, perceived gambling norms, and behavioral performance on the final 10 trials of the BART and PAC tasks showed the same pattern of non-significant results observed when using all 30 trials of the BART and all 40 trials of the PAC task.

Personalized Normative Feedback Intervention

In theory, personalized normative feedback influences behavior by targeting and correcting misperceptions of social norms. It was hypothesized that personalized normative feedback would result in changes in perceived descriptive norms from baseline to one-week follow-up. The results of a series of repeated measures ANOVAs suggested that the intervention influenced ratings of perceived gambling norms in the predicted direction (see Table 3). A main effect of group was found for perceived gambling frequency, $F(1, 132) = 39.25, p < .001, \eta^2 = 0.23$, perceived annual expenditure, $F(1, 132) = 32.38, p < .001, \eta^2 = 0.20$, and perceived maximum single-day loss, $F(1, 132) = 18.78, p < .001, \eta^2 = 0.12$, with the PNF group showing lower ratings on all categories of perceived norms. A main effect of time was found for perceived gambling frequency, $F(1, 132) = 125.66, p < .001, \eta^2 = 0.37$, perceived

annual expenditure, $F(1, 132) = 100.57, p < .001, \eta^2 = 0.36$, and perceived maximum single-day loss, $F(1, 132) = 63.51, p < .001, \eta^2 = 0.26$, with participants reporting decreased perceived norms at one-week follow-up. The main effect of gender was not significant for perceived gambling frequency, $F(1, 132) = 0.18, p = .68, \eta^2 = 0.00$, perceived annual expenditure, $F(1, 132) = 0.39, p = .54, \eta^2 = 0.00$, and perceived maximum single-day loss, $F(1, 132) = 0.83, p = .37, \eta^2 = 0.01$.

With regard to two-way interactions, a significant group by time interaction effect was observed for perceived gambling frequency, $F(1, 132) = 73.86, p < .001, \eta^2 = 0.22$, perceived annual expenditure, $F(1, 132) = 48.45, p < .001, \eta^2 = 0.17$, and perceived maximum single-day loss, $F(1, 132) = 43.50, p < .001, \eta^2 = 0.18$, such that participants in the PNF group showed marked decreases in their perception of gambling norms from baseline to one-week follow-up. The gender by time interaction effect was not significant for perceived gambling frequency, $F(1, 132) = 0.72, p = .40, \eta^2 = 0.00$, perceived annual expenditure, $F(1, 132) = 0.94, p = .33, \eta^2 = 0.00$, and perceived maximum single-day loss, $F(1, 132) = 0.43, p = .51, \eta^2 = 0.00$. Furthermore, the gender by group interaction effect was not significant for perceived gambling frequency, $F(1, 132) = 0.24, p = .62, \eta^2 = 0.00$, perceived annual expenditure, $F(1, 132) = 0.42, p = .52, \eta^2 = 0.00$, and perceived maximum single-day loss, $F(1, 132) = 0.93, p = .34, \eta^2 = 0.01$. Finally, the gender by group by time interaction effect was not significant for perceived gambling frequency, $F(1, 132) = 3.12, p = .08, \eta^2 = 0.01$, perceived annual expenditure, $F(1, 132) = 0.14, p = .71, \eta^2 = 0.00$, and perceived maximum single-day loss, $F(1, 132) = 2.58, p = .11, \eta^2 = 0.01$.

The primary hypothesis of the current study was that personalized normative feedback would result in decreases in the level of risk and expenditure observed on the analog measures of gambling behavior across three time points: baseline, immediate follow-up, and one-week follow-up. This hypothesis was tested using a series of repeated measures ANOVAs, the result of which are presented in Table 4. With regard to BART performance, the main effect of group was not significant for adjusted pumps per trial, $F(1, 132) = 0.13, p = .72, \eta^2 = 0.00$. A significant main effect of time was observed for adjusted pumps per trial, $F(2, 264) = 42.47, p < .001, \eta^2 = 0.23$, with adjusted pumps per increasing over time. The main effect of gender was not significant, $F(1, 132) = 0.02, p = .90, \eta^2 = 0.00$.

Most notably, a significant group by time interaction effect was observed for adjusted pumps per trial, $F(2, 264) = 4.07, p = .02, \eta^2 = 0.02$, such that participants in the Control group showed a greater increase in adjusted pumps per trial from baseline to one-week follow-up. The gender by time interaction was not significant, $F(2, 264) = 2.53, p = .08, \eta^2 = 0.01$. Furthermore, the gender by group interaction was not significant, $F(1, 132) = 0.51, p = .48, \eta^2 = 0.00$. Finally, the gender by group by time interaction was not significant, $F(2, 264) = 1.44, p = .24, \eta^2 = 0.01$.

With regard to PAC task performance, the main effect of group was not significant for the risk coefficient, $F(1, 132) = 0.90, p = .34, \eta^2 = 0.01$, and total expenditure, $F(1, 132) = 0.05, p = .83, \eta^2 = 0.00$. The main effect of time was also not significant for the risk coefficient, $F(2, 264) = 0.89, p = .41, \eta^2 = 0.01$. However, a significant main effect of time was observed for total expenditure, $F(2, 264) = 5.78, p = .003, \eta^2 = 0.04$, such that participants wagered more money over time. The main effect of gender was not significant for the risk coefficient, $F(1, 132) = 3.11, p = .08, \eta^2 = 0.02$. The only significant main effect of gender observed was on total expenditure, $F(1, 132) = 4.66, p = .03, \eta^2 = 0.03$, with men wagering more total money than women.

In support of the primary hypothesis, a significant group by time interaction effect was observed for the risk coefficient, $F(2, 264) = 3.53, p = .03, \eta^2 = 0.03$, and total expenditure,

$F(2, 264) = 3.36, p = .04, \eta^2 = 0.02$, such that participants in the Control group showed a greater increase in the risk coefficient and total money wagered from baseline to one-week follow-up. The gender by time interaction effect was not significant for the risk coefficient, $F(2, 264) = 2.67, p = .07, \eta^2 = 0.02$, and total expenditure, $F(2, 264) = 1.96, p = .14, \eta^2 = 0.01$. Furthermore, the gender by group interaction effect was not significant for the risk coefficient, $F(1, 132) = 2.56, p = .11, \eta^2 = 0.02$, and total expenditure, $F(1, 132) = 2.94, p = .09, \eta^2 = 0.02$. Finally, the gender by group by time interaction effect was not significant for the risk coefficient, $F(2, 264) = 0.43, p = .65, \eta^2 = 0.00$, and total expenditure, $F(2, 264) = 0.85, p = .43, \eta^2 = 0.01$.

In support of the primary hypothesis, a significant group by time interaction effect was observed for the risk coefficient, $F(2, 268) = 3.66, p = .03, \eta^2 = 0.03$, and total expenditure, $F(2, 268) = 3.25, p = .04, \eta^2 = 0.02$, such that participants in the Control group showed a greater increase in the risk coefficient and total money wagered from baseline to one-week follow-up.

Comment

These results – based on direct observation of behavior as well as self-report – demonstrate the efficacy of personalized normative feedback as a stand-alone intervention for gambling among college students. These laboratory-based results extend the findings of the only other study examining personalized feedback for college student gambling¹⁵, both of which used efficacious models from the alcohol literature. The computer-based intervention developed within the current study can be administered in less than five minutes, theoretically making it a cost-effective intervention with the potential to be delivered in multiple contexts.

College Students' Misperception of Gambling

In line with previous research on misperceptions of gambling among college students, the current results illustrate a robust pattern of significant differences between participants' perceptions of gambling norms and the actual norms obtained from a sample of their peers. Given that, on average, the current sample reported greater frequency, annual expenditure, and maximum single-day loss in the past year compared to the normative sample, it is possible the observed overestimation of gambling norms is a by-product of greater frequency and quantity of self-reported gambling. However, a series of paired-sample *t*-tests showed that the current sample's perceived gambling norms were also significantly higher than their own self-reported gambling! This degree of overestimation is consistent with the hypothesized general tendency to overestimate high-risk behaviors on college campuses^{9, 37}.

The Relation between Perceptions and Behavior

The current results also support the hypothesis that misperceptions of gambling norms would be positively correlated with participants' self-reported gambling. The observed pattern of results is consistent with findings from prior investigations⁹⁻¹². It should be noted that, although these statistically significant associations between perceived and self-reported gambling imply a causal relationship between misperception of norms and increased gambling, more research is needed to affirm causality or rule out the operation of a third variable. Longitudinal research methodology should be employed to assess the temporal dynamics of the association between perceived gambling norms and self-reported behavior.

Contrary to predictions, perceived gambling norms were not significantly associated with the baseline performance on the BART and PAC tasks. Furthermore, baseline performance on these analog gambling tasks was not significantly associated with the participants' self-

reported gambling. These results were unexpected, especially in the context of previous research on the association between self-reported gambling and BART performance³³, and between self-reported gambling and PAC performance discerned in our own pilot study. With specific regard to the PAC task, one explanation for the observed difference in findings is that the pilot sample of 60 undergraduates included non-gamblers, who, on average, evinced lower risk taking on both indices (i.e., the risk coefficient and total expenditure). It is possible that exclusion of non-gamblers from the current sample attenuated the association between self-reported gambling and task performance.

Another possible explanation relates to the novelty of the behavioral tasks employed. At baseline, both the BART and PAC tasks were new to all participants. With specific regard to the BART, previous research shows that risk-taking increases as the participant progresses through the task, akin to a learning process that develops with time and experience³⁸. Therefore, even among our sample of higher frequency gamblers, it may be unrealistic to assume that baseline testing would reflect the peak risk level they would otherwise achieve over time. Supplemental analysis of the BART and PAC task data demonstrated that risk-taking did increase over the course of the baseline administrations. That is, participants evinced more pumps per trial, higher risk coefficients, and increased expenditure in the later stages of these tasks. Despite the increase in risk-taking, correlation analyses using the final 10 trials of each task showed the same pattern of non-significant associations observed when using the full baseline administrations. Further evaluation of the temporal development of risk-taking on both the BART and PAC tasks is warranted, and could be accomplished through the use of long-form versions of these tasks (i.e., the 90-trial BART and 120-trial PAC task) with both gambling and non-gambling individuals.

The Personalized Normative Feedback Intervention

The focal aim of this study was to examine the efficacy of a brief personalized normative feedback intervention targeting misperceived gambling norms. The results illustrate a robust effect such that perceived norms markedly decreased from baseline to one-week follow up among individuals who received the experimental intervention. Among individuals who received the attention control task, perception of gambling norms remained relatively unchanged. This pattern of results was comparable for males and females.

With regard to the effect of the intervention on behavior, analysis of the analog gambling task performance illustrated a consistent pattern in which individuals in the PNF condition performed comparably to those in the Control condition at baseline and immediate follow-up, but produced lower risk-taking at one-week follow-up. A corresponding pattern of significant group by time interactions was observed on all three risk indices. Once again, this pattern of results was comparable for males and females. These results support the hypothesis that individuals who received the experimental intervention would evince lower levels of risk and expenditure (i.e., compared to individuals in the control group) on the two analog gambling tasks. However, the observed pattern of results is somewhat different than originally expected. Specifically, it appears as though individuals in the Control condition continue to increase their risk-taking over time, while individuals in the PNF condition increase slightly at immediate follow-up then plateau at a lower risk-level at one-week follow-up.

Returning to the conceptualization of the BART and PAC as novel tasks, it is possible that the observed pattern in the Control group may reflect a natural course of increased risk-taking over time and experience. In contrast, it appears the personalized normative feedback intervention may have interfered with this process, resulting in a lower level of risk-taking at one-week follow-up than what may have otherwise occurred. In theory, the observed pattern of efficacy resembles a preventative process, in that the personalized normative feedback

intervention altered behavior before it fully developed. However, the clinical utility of personalized normative feedback should also be measured by its ability to *decrease* a target behavior. To further test the clinical utility of personalized normative feedback using the same methodology, individuals in both the Control and PNF groups could be exposed to multiple administrations of the BART and PAC prior to the manipulation phase. If peak risk-taking is achieved over time as hypothesized, the delayed administration of the manipulation would make it possible to test whether risk-taking behavior would actually decrease among PNF individuals. This hypothetical developmental sequence and its alteration by PNF are illustrated in Figure 1.

Given the early stage of this line of research, the main strength of this study is the degree of control achieved through laboratory-based methodology. Previous studies examining the association between social norms and gambling have relied exclusively on retrospective self-report of gambling. In addition to self-report, the current study employed two analog measures framed as “gambling opportunities” to objectively measure changes in behavior. The use of multiple tasks allowed for the evaluation of consistency in the pattern of behavioral change. At a more fundamental level, the randomized clinical trial design resulted in two groups that were comparable in terms of self-reported gambling, perceived gambling norms, and baseline task performance. Furthermore, the observed retention rate from baseline to one-week follow-up was very high (i.e., 94%).

Limitations

Whereas experimental control is perceived as a strength of the laboratory approach, perhaps the most notable limitation of the current study is the corresponding sacrifice of some degree of ecological validity. In line with previous studies of gambling behavior^{33, 34}, the current study used performance on computer-based risk tasks as an index of gambling. While risk is the key feature of gambling, it is clear that the behavior observed in the lab is different than gambling in a natural context. Consequently, the translation of efficacy into effectiveness, or whether personalized normative feedback would alter “real life” gambling remains unanswered.

Furthermore, the follow-up duration for the current study was relatively brief. Certainly, it seemed appropriate to evaluate the short-term efficacy of the intervention before evaluating the long-term efficacy (e.g., one month or longer). And, given the duration and structure of the academic year, the one-week interval offered the most practical solution to recruitment and follow-up scheduling within a population of college students. In line with the alcohol literature, future studies should evaluate the efficacy of personalized normative feedback for gambling at one-month and beyond.

The main inclusion criterion for the current study could also be viewed as a relative limitation. In order to facilitate timely recruitment while maximizing the potential to recruit higher frequency gamblers, the criterion was set at “participation in at least one gambling activity during the past 30 days.” This criterion could result in the inclusion of a wide range of individuals, from daily gamblers to someone who bought a single scratch ticket. It could just as easily leave out frequent or binge gamblers that have coincidentally not gambled within the past month. Evaluation of the data demonstrated that the criterion was effective, in that the current sample reported higher frequency and quantity of gambling in contrast to the normative sample. Additionally, we believed that the use of “typical student who gambles” as a normative referent was appropriate at this early stage of research. However, this does not allow for the evaluation of the normative influence of more proximal groups (e.g., gender-specific referents). If this line of research is consistent with its parallel in the alcohol literature, the differential influence of alternative reference groups will likely become a focus of future studies. Another limitation pertaining to our use of personalized

normative feedback is that, with the exception of gambling frequency, the other descriptive norms employed focused on losses rather than wins. These descriptive norms were selected based on the strength of their association with self-reported gambling. An investigation of the influence of personalized normative feedback using perceived norms around winning may be warranted in the future.

Conclusions

The results of this preliminary, laboratory-based investigation illustrate the efficacy of a stand-alone personalized normative feedback intervention as a viable method of eliciting cognitive and behavioral change with regard to gambling among college students. Many more questions must be answered in order to determine the true clinical utility of such an intervention, and efforts underway among other gambling researchers (C. Neighbors, personal communication) suggest that the process of obtaining these answers has been set in motion. However, with the alcohol literature as an established model, it is currently recommended that practitioners working with students who gamble begin to assess not only quantity and frequency of gambling (e.g., how often do *you* gamble?), but also the student's perception of gambling norms (e.g., how often do you think *the typical student at our university* gambles?). If a student clearly overestimates gambling among other their peers, we recommend the provision of accurate descriptive normative feedback, to be delivered in a personalized and non-judgmental way in keeping with the widely used BASICS program³¹, as well as the spirit and principles of Motivational Interviewing³⁹.

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References

1. Lewis MA, Neighbors C. Social norms approaches using descriptive drinking norms education: A review of the research on personalized normative feedback. *J Am Coll Health*. 2006; 54:213–218. [PubMed: 16450845]
2. Collins SE, Carey KB, Sliwinski MJ. Mailed personalized normative feedback as a brief intervention for at-risk college drinkers. *J Stud Alcohol*. 2002; 63:559–567. [PubMed: 12380852]
3. Borsari B, Carey KB. Peer influences on college drinking: A review of the research. *J Subst Abuse*. 2001; 13:391–424. [PubMed: 11775073]
4. Perkins HW, Berkowitz AD. Perceiving the community norms of alcohol use among students: Some research implications for campus alcohol education programming. *Int J Addict*. 1986; 21:961–976. [PubMed: 3793315]
5. Larimer ME, Crouce JM. Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addic Behav*. 2007; 32:2439–2468.
6. Neighbors C, Larimer ME, Lewis MA. Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. *J Consult Clin Psychol*. 2004; 72:434–447. [PubMed: 15279527]
7. Neighbors C, Lewis MA, Bergstrom RL, Larimer ME. Being controlled by normative influence: Self-determination as a moderator of a normative feedback alcohol intervention. *Health Psychol*. 2006; 25:571–579. [PubMed: 17014274]
8. Neighbors C, Lewis MA, Atkins DC, Jensen MM, Walter T, Fossos N, et al. Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. *J Consult Clin Psychol*. 2010; 78:898–911. [PubMed: 20873892]

9. Larimer ME, Neighbors C. Normative misperceptions and the impact of descriptive and injunctive norms on college student gambling. *Psychol Addict Behav.* 2003; 17:235–243. [PubMed: 14498818]
10. Sheeran P, Orbell S. Augmenting the theory of planned behavior: Roles for anticipated regret and descriptive norms. *J Appl Soc Psychol.* 1999; 29:2107–2142.
11. Moore SM, Ohtsuka K. The prediction of gambling behavior and problem gambling from attitudes and perceived norms. *Soc Behav Pers.* 1999; 27:455–466.
12. Martin RJ, Usdan S, Nelson S, Umstattd MR, LaPlante D, Perko M, et al. Using the theory of planned behavior to predict gambling behavior. *Psychol Addict Behav.* 2010; 24:89–97. [PubMed: 20307115]
13. Neighbors C, Lostutter TW, Whiteside U, Fossos N, Walker DD, Larimer ME. Injunctive norms and problem gambling among college students. *J Gambl Stud.* 2007; 23:259–273. [PubMed: 17394053]
14. Takushi RY, Neighbors C, Larimer ME, Lostutter TW, Cronce JM, Marlatt GA. Indicated prevention of problem gambling among college students. *J Gambl Stud.* 2004; 20:83–93. [PubMed: 14973399]
15. Larimer ME, Neighbors C, Lostutter TW, Whiteside U, Cronce JM, Kaysen D, et al. Brief motivational feedback and cognitive behavioral interventions for prevention of disordered gambling: A randomized clinical trial. *Addiction.* 2011; 107:1148–1158. [PubMed: 22188239]
16. National Gambling Impact Study Commission. [June 1, 2011] National Gambling Impact Study Commission Report. Available at: <http://www.ncfamily.org/specialngisc.html>.
17. Petry, NM. Pathological gambling: Etiology, comorbidity, and treatment. American Psychological Association; Washington, DC: 2005.
18. Barnes GM, Welte JW, Hoffman JH, Tidwell MO. Comparisons of gambling and alcohol use among college students and noncollege young people in the United States. *J Am Coll Health.* 2010; 58:443–452. [PubMed: 20304756]
19. Kessler RC, Hwang I, LaBrie R, Petukhova M, Sampson NA, Winters KC, et al. DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychol Med.* 2008; 38:1351–1360. [PubMed: 18257941]
20. Shaffer HJ, Hall MN, Vander Bilt J. Estimating the prevalence of disordered gambling behavior in the United States and Canada: A research synthesis. *Am J Public Health.* 1999; 89:1369–1376. [PubMed: 10474555]
21. Chambers RA, Potenza MN. Neurodevelopment, impulsivity, and adolescent gambling. *J Gambl Stud.* 2003; 19:53–84. [PubMed: 12635540]
22. Spear, LP. The behavioral neuroscience of adolescence. W. W. Norton & Company; New York: 2010.
23. Wilber MK, Potenza MN. Adolescent gambling: Research and clinical implications. *Psychiatry.* 2006; 3:40–48. [PubMed: 20877546]
24. Barnes GM, Welte JW, Hoffman JH, Dintcheff BA. Effects of alcohol misuse on gambling patterns in youth. *J Stud Alcohol.* 2005; 63:767–775. [PubMed: 12529078]
25. Iacono WG, Malone SM, McGue M. Behavioral disinhibition and the development of early-onset addiction: Common and specific influences. *Annu Rev Clin Psychol.* 2008; 4:325–348. [PubMed: 18370620]
26. Wynne, HJ.; Smith, GJ.; Jacobs, DF. Adolescent gambling and problem gambling in Alberta. Alberta Alcohol and Drug Abuse Commission; Edmonton: 1996.
27. Lee HP, Chae PK, Lee HS, Kim YK. The five-factor gambling motivation model. *Psychiatry Res.* 2007; 150:21–32. [PubMed: 17270278]
28. Neighbors C, Lostutter TW, Cronce JM, Larimer ME. Exploring college student gambling motivation. *J Gambl Stud.* 2001; 18:361–370. [PubMed: 12514915]
29. Grant JE, Kushner MG, Kim SW. Pathological gambling and alcohol use disorder. *Alc Res Health.* 2002; 26:143–150.
30. Shaffer H, LaPlante DA, LaBrie RA, Kidman RC, Donato AN, Stanton MV, et al. Toward a syndrome model of addiction: Multiple expressions, common etiology. *Harv Rev Psychiatry.* 2004; 12:367–374. [PubMed: 15764471]

31. Dimeff, LA.; Baer, JS.; Kivlahan, DR.; Marlatt, GA. Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach. Guilford Press; New York: 1999.
32. Lejuez CW, Read JP, Kahler CW, Richards JB, Ramsey SE, Stuart GL, et al. Evaluation of a behavioral measure of risk taking: The Balloon Analogue Risk Task (BART). *J Exp Psychol Appl*. 2002; 8:75–84. [PubMed: 12075692]
33. Misha S, Lalumière ML, Williams RJ. Gambling as a form of risk-taking: Individual differences in personality, risk-accepting attitudes, and behavioral preferences for risk. *Pers Individ Dif*. 2010; 49:616–621.
34. Floyd K, Whelan JP, Meyers AW. Use of warning messages to modify gambling beliefs and behavior in a laboratory investigation. *Psychol Addict Behav*. 2006; 20:69–74. [PubMed: 16536667]
35. Pleskac TJ, Wallsten TS, Wang P, Lejuez CW. Development of an automatic response mode to improve the clinical utility of sequential risk-taking tasks. *Exp Clin Psychopharmacol*. 2008; 16:555–564. [PubMed: 19086776]
36. Neighbors C, Lostutter TW, Larimer ME, Takushi RY. Measuring gambling outcomes among college students. *J Gambl Stud*. 2002; 18:339–360. [PubMed: 12514914]
37. Haines M, Spear SF. Changing the perception of the norm: A strategy to decrease binge drinking among college students. *J Am Coll Health*. 1996; 45:134–140. [PubMed: 8952206]
38. Pleskac TJ, Wershbae A. Making assessments while taking repeated risks: A pattern of multiple response pathways. *J Exp Psychol Gen*. 2012 Advance online publication. Doi 10.1037/a0031106.
39. Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people for change. 2nd ed.. Guilford; New York: 2002.

Figure 1.

Hypothetical graph illustrating the proposed impact of our personalized normative feedback intervention at different time-points. Line A represents the hypothesized development of risk-taking as it increases and then plateaus over time. Absent any intervention, individuals in the control group appear to be moving along this trajectory. PNF1 represents the early administration of personalized normative feedback employed in this study. Line B represents the alternate trajectory displayed by individuals who received the intervention. PNF2 represents a delayed administration of personalized normative feedback. Line C represents the hypothesized effect of the delayed intervention on behavior, with risk-taking decreasing among individuals who receive normative feedback.

Table 1

Descriptive and Summary Statistics by Experimental Group

Variable	PNF (<i>n</i> = 68) <i>M</i> (<i>SD</i>)	Control (<i>n</i> = 68) <i>M</i> (<i>SD</i>)	<i>t</i>	<i>p</i>
Self-reported Gambling:				
Frequency ^a	4.51 (2.23)	4.79 (2.16)	0.74	.46
Annual Expenditure ^b	1.93 (1.52)	1.99 (1.61)	0.22	.83
Max Single Day Loss ^b	1.60 (1.35)	1.94 (1.51)	1.38	.17
Perceived Gambling:				
Frequency ^a	5.31 (1.60)	5.78 (1.50)	1.76	.08
Annual Expenditure ^b	3.53 (1.52)	3.85 (1.76)	1.15	.25
Max Single Day Loss ^b	3.88 (2.22)	4.16 (2.08)	0.76	.45
Baseline Behavioral Measures:				
BART - pumps per trial	35.23 (14.58)	34.04 (14.68)	0.48	.64
PAC - risk coefficient	.025 (.013)	.027 (.014)	0.93	.36
PAC - total money wagered	218.90 (101.21)	220.81 (\$104.97)	0.11	.91

^aFrequency is scored on an 11-point scale with 1 indicating “never” and 11 indicating “every day” (higher scores indicate greater frequency).

^bAnnual Expenditure and Maximum Single-Day Loss are scored on a 10-point scale with 1 indicating “less than \$25” and 10 indicating “\$2000 or more” (higher scores indicate greater loss).

Table 2

Mean Gambling Norms at Baseline

Variable	Perceived Norm <i>M</i> (<i>SD</i>)	Actual Norm <i>M</i> (<i>SD</i>)	Current Sample Norm <i>M</i> (<i>SD</i>)
Gambling Frequency ^{<i>a</i>}	5.54 (1.57)	3.92 (1.72) [*]	4.65 (2.19) ^{*†}
Annual Expenditure ^{<i>b</i>}	3.69 (1.64)	1.59 (1.25) [*]	1.95 (1.56) ^{*†}
Maximum Single-Day Loss ^{<i>b</i>}	4.02 (2.15)	1.43 (1.03) [*]	1.77 (1.43) ^{*†}

^{*a*} Gambling Frequency is scored on an 11-point scale with 1 indicating “never” and 11 indicating “every day” (higher scores indicate greater frequency).

^{*b*} Annual Expenditure and Maximum Single-Day Loss are scored on a 10-point scale with 1 indicating “less than \$25” and 10 indicating “\$2000 or more” (higher scores indicate greater loss).

^{*} Indicates significant difference ($p < .01$) compared to the Perceived Norm.

[†] Indicates significant difference ($p < .01$) compared to the Actual Norm.

Table 3
Repeated Measures ANOVA Examining Change in Perceived Gambling Norms over Time by Experimental Group

Variable	Group	Time			F-test		
		Baseline <i>M(SD)</i>	1-week Follow-up <i>M(SD)</i>	Overall <i>M(SD)</i>	Group ^a	Time ^b	Group × Time ^c
Gambling Frequency	PNF	5.31 (1.60)	2.99 (1.04)	4.15 (1.11)	39.25 [*]	125.66 [*]	73.86 [*]
	Control	5.78 (1.50)	5.42 (1.72)	5.60 (1.51)			
	Overall	5.54 (1.57)	4.21 (1.87)				
Annual Expenditure	PNF	3.53 (1.52)	1.38 (0.69)	2.46 (0.94)	32.38 [*]	100.57 [*]	48.45 [*]
	Control	3.85 (1.76)	3.46 (1.53)	3.65 (1.47)			
	Overall	3.69 (1.64)	2.42 (1.58)				
Max Single Day Loss	PNF	3.88 (2.22)	1.63 (1.18)	2.76 (1.49)	18.78 [*]	63.51 [*]	43.50 [*]
	Control	4.16 (2.08)	3.89 (1.85)	4.03 (1.79)			
	Overall	4.02 (2.15)	2.76 (1.92)				

^aTests the main effect of group.

^bTests the main effect of time.

^cTests the group by time interaction effect.

* $p < .001$.

Table 4

Repeated Measures ANOVA Examining Change in Performance on the BART and PAC over Time by Experimental Group

Variable	Group	Time				F-test	
		Baseline <i>M</i> (<i>SD</i>)	Post-Feedback <i>M</i> (<i>SD</i>)	1-week Follow-up <i>M</i> (<i>SD</i>)	Overall <i>M</i> (<i>SD</i>)	Group ^a Time ^b	Group × Time ^c
BART - pumps per trial	PNF	35.23 (14.58)	39.81 (15.40)	41.15 (13.89)	38.73 (13.78)	0.13	42.47***
	Control	34.04 (14.68)	39.15 (15.26)	45.05 (15.99)	39.41 (13.65)		
	Overall	34.63 (14.59)	39.48 (15.28)	43.10 (15.05)			
PAC - risk coefficient	PNF	.025 (.014)	.026 (.013)	.025 (.012)	.025 (.011)	0.90	0.89
	Control	.027 (.013)	.026 (.014)	.030 (.015)	.028 (.013)		
	Overall	.026 (.014)	.026 (.013)	.027 (.014)			
PAC - total money wagered	PNF	218.89 (101.21)	235.03 (108.69)	226.68 (108.48)	226.87 (97.22)	0.05	5.78**
	Control	220.81 (104.97)	232.18 (114.40)	252.31 (106.31)	235.10 (101.82)		
	Overall	219.85 (102.73)	233.60 (111.18)	239.49 (107.77)			

^aTests the main effect of group.^bTests the main effect of time.^cTests the group by time interaction effect.*
 $p < .05$.**
 $p < .01$.***
 $p < .001$.