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ORIGINAL PAPER

Gambling-Related Problems as a Mediator Between Treatment and Mental Health with At-Risk College Student Gamblers

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Abstract Disordered gambling has been linked to increased negative affect, and some promising treatments have been shown to be effective at reducing gambling behaviors and related problems (Larimer et al. in Addiction 107:1148–1158, 2012). The current study seeks to expand upon the findings of Larimer et al. (Addiction 107:1148–1158, 2012) by examining the relationship between gambling-related problems and mental health symptoms in college students. Specifically, the three-group design tested the effects of two brief interventions for gambling—an individual, in-person personalized feedback intervention (PFI) delivered using motivational interviewing and group-based cognitive behavioral therapy, versus assessment only on mood outcomes. The mediating effect of gambling-related problems on mood was also explored. Participants (N = 141; 65 % men; 60 % Caucasian, 28 % Asian) were at-risk college student gamblers [South Oaks Gambling Screen (Lesieur and Blume in Am J Psychiatry 144:1184–1188, 1987) ≥3], assessed at baseline and 6-month follow-up. Gambling problems were assessed using the Gambling Problems Index (Neighbors et al. in J Gamb Stud 18:339–360, 2002). Mental health symptoms were assessed using the depression, anxiety, and hostility subscales of the Brief Symptom Inventory (Derogatis in Brief Symptom Inventory (BSI): administration, scoring, and procedures manual, National Computer Systems, Inc., Minneapolis, 1993). Results revealed that the PFI condition differentially reduced negative mood, and that reductions in gambling-related problems partially mediated this effect. Implications for intervention for comorbid mood and gambling disorders are discussed.

Keywords College students · Gambling · Mental health · Comorbidity

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Introduction

Gambling and Related Problems in College Students

High-risk gambling in college students has received increasing attention in the research and clinical literature. Rates vary significantly across studies (c.f., 6 %, Barnes et al. 2010; 4.2 %, Martin et al. 2013; 2.4–9.7 % among Australian students, Moore et al. 2013; and <1 % averaged across multiple European counters, Planzer et al. 2013). Higher prevalence rates have been found in large-scale meta-analyses, ranging from 10.23 % for probable pathological gamblers (Nowak and Aloe 2013) to 16 % for at-risk and probable pathological gamblers(Shaffer and Hall 2001). Regardless of the study, these rates are almost universally higher than the national adult population in the United States, which is between 1 and 2 % (Shaffer and Hall 2001). Disordered gambling is associated with a host of consequences including role impairment (e.g., academics, work, athletics), financial difficulties, legal involvement, relationship problems, low self-esteem, depressive symptoms, and increased risk for suicide (Lorains et al. 2011; Gupta and Derevensky 1998, 2000; Neighbors et al. 2002).

Gambling and Mood

Multiple studies have suggested significant comorbidity exists between disordered gambling and negative mood. In a sample of pathological gamblers, Hodgins et al. (2005) found that the lifetime prevalence rate of mood disorders was 60 %, and in the past year was 20 %. Comorbidity rates in national samples indicate that up to 38–50 % of pathological gamblers also have a mood disorder (Lorains, et al. 2011; Petry et al. 2005), "suggesting that treatment for one condition should involve assessment and possible concomitant treatment for comorbid conditions" (Petry et al. 2005 p. 564). Although not directly assessing mood, Bergevin et al. (2006) found that adolescents experiencing disordered gambling reported significantly more major negative life events than either social gamblers or non-gamblers. Moreover, relief of negative affective states is a common motivation for gambling among individuals seeking treatment (e.g., 40 %; Beaudoin and Cox 1999), as well as among non-treatment seeking college student gamblers (10 %; Neighbors et al. 2002. The evident use of gambling as a means to regulate "negative mood states or physiological states of hyper- or hypo-arousal" led Blaszczynski and Nower (2002) to include emotional vulnerability as a primary pathway in their integrated model of problem gambling.

The relationship between gambling problems and mood is not entirely clear; however it may indeed be that many individuals engage in gambling behaviors to alleviate or avoid negative affect. It is also possible that, as gambling moves into pathological levels, the associated consequences lead to increases in negative mood.

Gambling Interventions

Brief treatment approaches have shown promise with college student gamblers (Diskin and Hodgins 2009; Larimer et al. 2012; Petry et al. 2009), using cognitive behavioral therapy (CBT) techniques, motivational interviewing (MI) techniques, and/or personalized feedback interventions (PFI) to reduce frequency of gambling and related problems. There is also evidence to suggest such approaches may be beneficial for treatment of negative mood (e.g., Anderson 2007; Geisner et al. 2006; Westra and Dozois 2006). In light of the high comorbidity between disordered gambling and metal health symptoms (Petry et al. 2005),

examination of the effect of brief interventions for disordered gambling on mental health is warranted. Identifying how these approaches differentially affect gambling and mental health symptoms may enable the design of more streamlined and effective approaches.

Thus, the current study sought to assess the effects of two brief interventions (CBT and PFI), which were shown to be successful in reducing gambling in the Larimer et al. (2012), on mental health symptoms. Further, we wished to explore the relationship between gambling and mood by testing the mediating role of gambling-related problems (previously shown to be impacted by interventions) in the relationship between intervention and subsequent mood outcomes. Specifically, because the interventions did not directly address negative mood states, the current study tested whether reductions in gambling-related problems were partially responsible for the decreases in mental health symptoms.

Method

Participants

The current study was a secondary data analysis using data from the study by Larimer et al. (2012). The sample comprised 139 disordered college students gamblers, 65 % men, $M_{age} = 20.23$ years ($SD = 1.48$) from a large West Coast university. The sample was representative of the population on this campus in terms of ethnicity: Caucasian (59.6 %) or Asian/Asian American (28.4 %). All procedures were approved by the affiliated Institutional Review Board.

Procedures

In the original study, individuals meeting inclusion criteria at screening [South Oaks Gambling Screen (SOGS; Lesieur & Blume 1987) ≥ 3] completed baseline assessment. Participants were randomly assigned to 1 of 3 groups: in-person, individual (PFI, n = 48), group-based cognitive behavioral intervention (CBI, n = 43), or an assessment-only control (AOC, n = 48) group. Participants then completed a 6-month follow-up assessment (for complete methods see Larimer et al. 2012).

Intervention Descriptions

PFI

The PFI intervention was adapted from a previous intervention for problematic college student drinking (Dimeff et al. 1999). Individual sessions ranged from 60 to 90 min and used a motivational interviewing (MI; Miller and Rollnick 2002) style to facilitate discussion of personalized feedback generated from participants' answers to the baseline questionnaire. Topics included gambling patterns, perceived college student gambling norms, positive expectancies and experienced negative consequences of gambling, cognitive distortions, and situational self-efficacy to avoid gambling.

CBI

The CBI intervention was conducted in groups of 2–8 students, using a skills-based approach adapted from Petry et al. (2008). Students attended 4 or 6 1-h sessions that covered functional

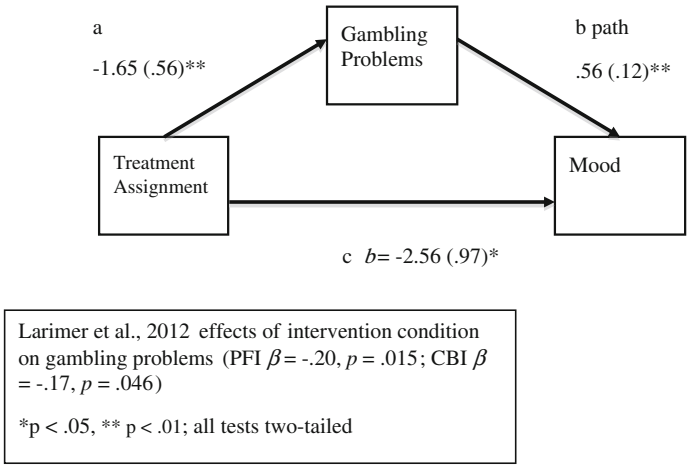

Fig. 1 Model of the mediating role of gambling problems in the relationship between treatment and mental health

analysis; challenging cognitive distortions, with particular emphasis on illusions of control; identifying and coping with triggers; exploring alternative responses; assertiveness training; and relapse prevention. Prior analyses (Larimer et al. 2012) indicated both interventions resulted in decreased gambling consequences with medium effect sizes (see Fig. 1) (PFI $d = .48$; CBI $d = .39$) and DSM-IV pathological gambling symptoms (PFI $d = .60$; CBI $d = .48$), in addition to reduced gambling frequency for PFI ($d = .48$).

Measures

Gambling consequences were assessed with a 20-item Gambling Problems Index (GPI, Neighbors et al. 2002). Higher scores on this measure indicate greater frequency of gambling-related problems. The reliability in this sample was $\alpha = .84$.

Mental health symptoms were measured with the Brief Symptom Inventory (BSI, Derogatis 1993) depression, anxiety, and hostility subscales, using a total sum score of all three scales. Higher scores on this measure indicate higher distress. The reliability in this sample was $\alpha = .91$.

Results

Variables were examined for univariate outliers and deviation from expected distributions. Extreme outliers were recoded to three standard deviations above the mean (Tabachnick and Fidell 2001). The current study used analysis of covariance (ANCOVA) to assess between-group differences on the outcome, mood symptoms at the 6-month follow-up assessment, co-varying baseline scores on the mood measure. Gambling problems were assessed as a mediator in the relationship between treatment condition and mood.

Preliminary analyses tested for baseline group differences on primary demographic and outcome variables and revealed no significant differences between groups (See Tables 1, 2).

Between-groups ANCOVA, controlling for baseline BSI, indicated a main effect for intervention condition on BSI scores at 6-month follow-up, $F(2, 95) = 4.00$, $p = .022$. Simple contrasts revealed a significant difference between PFI and AOC participants,

Table 1 Means (SDs) and percentages (Frequencies) on primary demographic variables

	AOC (n = 48)	CBI (n = 43)	PFI (n = 48)	Total sample (N = 139)
Age M (SD) $F = 1.89$, $p =$ ns	21.00 (1.60)	21.58 (1.49)	21.14 (1.30)	21.23 (1.48)
Gender (frequency) $\chi^2 = 2.20$, $p =$ ns				
Male	73.5 % (36)	59.1 % (26)	64.6 % (31)	66.0 % (93)
Female	26.5 % (13)	40.9 % (18)	35.4 % (17)	34.0 % (48)
Race (frequency)				
American Indian/Alaska Native	2.0 % (1)	0 % (0)	0 % (0)	.7 % (1)
Asian American	32.7 % (16)	63.6 % (28)	27.1 % (13)	28.4 % (40)
African American/Black	0 % (0)	0 % (0)	0 % (0)	0 % (0)
caucasian/White	53.1 % (26)	63.6 % (28)	62.5 % (30)	59.6 % (84)
Native Hawaiian/Other Pacific Islander	2.0 % (1)	2.3 % (1)	2.1 % (1)	2.1 % (3)
Multiracial	8.2 % (4)	4.5 % (2)	8.3 % (4)	7.1 % (10)
Other	2.0 % (1)	4.5 % (2)	0 % (0)	2.1 % (3)
Ethnicity (frequency) $\chi^2 = .334$, $p =$ ns				
Non-Hispanic/Latino	97.9 % (47)	97.7 % (43)	95.8 % (46)	97.1 % (136)
Hispanic/Latino	2.0 % (1)	2.3 % (1)	4.2 % (2)	2.9 % (4)

$p = .006$, with PFI participants reporting significantly fewer mental health symptoms, $M = 6.03$ ($SD = 7.16$), than AOC, M = 11.09 ($SD = 8.87$); CBI did not significantly differ from either condition, $M = 10.38$ ($SD = 7.29$).

Further analyses were conducted to assess the mediating effect of gambling problems in the relationship between treatment condition and mood. Analyses were limited to PFI and AOC participants due to lack of differences between CBI and either condition. A significant effect of treatment on gambling problems had previously been established by Larimer et al. (2012), affirming the path ("a") of the mediation model.

Due to the small sample size, we used nonparametric bootstrapping analyses (see Preacher and Hayes 2004; Preacher et al. 2007) using the Preacher and Hayes (2008) SPSS Macro for multiple mediation to assess gambling problems as a mediator of the relationship between treatment assignment and mood. In these analyses, mediation is significant if the 95 % bias corrected and accelerated confidence intervals for the indirect effect do not include 0 (Preacher and Hayes 2004; Preacher et al. 2007).

Results based on 1,000 bootstrapped samples support the hypothesized mediational model (see Fig. 1), indicating that the total effect of treatment assignment on mood (c path) was significant (Total Effect = −2.56, SE = .97, $p = .01$), and the direct effect (c' path) was not (Direct Effect = −1.64, SE = .98, $p = .10$), indicating that gambling problems partially mediated the relationship between treatment assignment and mood (IE lower 95 % CI = −1.78, upper 95 % CI = −.30). Because zero is not in the 95 % confidence interval, the indirect effect is significantly different from zero at $p < .05$ (two tailed). These results suggest that participants assigned to the personal feedback condition versus assessment only had fewer gambling-related problems, and via that pathway, had lower levels of negative affect.

Specifically, assignment to the PFI condition versus AOC was associated with a decrease of 1.65 points in the GPI scale, and 2.56 points on the BSI. A decrease of one point of the GPI was associated with a .56 decrease on the BSI. When GPI was added to the model, however, the effect of treatment assignment on mood was reduced to −1.64, with an indirect effect of −.92.

Table 2 Means (SDs) on primary outcome measures at baseline and 3-month follow-up by group

	AOC (n = 48) Mean (SD)	CBI (n = 43) Mean (SD)	PFI (n = 48) Mean (SD)	Total Sample (N = 139) Mean (SD)
BSI				
Baseline $F = .437$, $p =$ ns	10.25 (2.35)	10.63 (2.33)	10.26 (2.22)	10.36 (2.29)
Post course	11.09 (8.87)	10.38 (7.29)	6.03 (.83)	9.09 (8.14)
GPI				
Baseline $F = 1.71$, $p =$ ns	24.27 (1.16)	24.15 (1.07)	24.59 (1.26)	24.35 (1.17)
Post course	25.13 (6.13)	21.93 (2.81)	21.83 (2.57)	23.09 (4.53)

BSI Brief Symptom Inventory, *GPI* Gambling Problems Inventory

Discussion

The current study investigates the effects of two brief interventions, previously supported for their efficacy in reducing gambling behavior, on mental health symptoms. In partial support of the current study hypotheses, results indicated that, while there was a main effect for intervention on BSI symptoms, it was participants in the Personalized Feedback condition, versus those in the control condition, who showed significant reductions in mental health symptoms. The Cognitive-Behavioral Condition was not significantly different from either condition. Previous research has supported the efficacy of both treatments in reducing gambling behaviors, specifically with college students (Larimer et al. 2012), and the sample in the current study was screened specifically for disordered gambling. It is possible that individual versus group settings, focus on personalized behaviors and solutions, and other content differences (e.g. Cognitive-Behavioral group focusing on identifying and coping with triggers; exploring alternative responses, assertiveness training) contributed to better outcomes for mood in the personalized feedback group.

In addition to assessing effects of the brief interventions on mental health symptoms, we hypothesized that reduction in gambling-related problems would have a mediating effect in this relationship. Because the brief Cognitive-Behavioral group did not significantly differ from the control condition in its effect on mood symptoms, mediational effects in the relationship between the personalized feedback group versus control group and mental health were examined. As hypothesized, gambling problems partially mediated the relationship between this intervention and mental health symptoms. Those in the intervention showed fewer gambling-related problems at 6 months, which was in turn related to decreases in mental health symptoms. Results suggest the effect of treatment assignment (personalized feedback versus control) on mood when gambling consequences are added to the model, such that mood indirectly decreases through gambling consequences by .92 points on the BSI scale for participants in personalized feedback versus control conditions. Due to the cross-sectional design (all follow-up data collected at 6-months), conclusions regarding directionality are limited. The current results suggest that as PFI successfully reduced gambling problems, negative affect in turn also decreased. The absence of a main effect of the CBI on mood lends further support to this association, as CBI was associated with smaller decreases in consequences in the original study (Larimer et al. 2012), and smaller decreases in consequences would predict smaller changes in mood if a mediational relationship between intervention and mood truly existed. Despite evidence of the role of problems in the relationship between treatment and mood, it is possible that other

mechanisms may also be affecting mental health in the PFI condition. Future studies should assess other potential mechanisms using multiple follow-up time points in order to establish the temporal precedence needed to establish causality.

Clinical Implications

Two key clinical implications emerge from the results of this study: First, the importance of addressing the relationship between co-occurring mental health symptoms and disordered gambling in college students, and second, how to best effectively address this. Despite evidence that gambling is highly prevalent in college students (Shaffer and Hall 2001), limited research has examined comorbid mental health issues facing students with gambling problems. Considering the high rates of comorbidity of pathological gambling, depression, and anxiety in adult populations (Hodgins et al. 2005; Petry et al. 2005), this study supports that comorbidity is important to address during the college years. The current study further indicates that brief interventions for gambling could have mental health implications above and beyond reducing disordered gambling.

Ultimately, the results highlight the beneficial crossover effects of a specific brief intervention, PFI, which has been previously supported for its efficacy in reducing disordered gambling among college students (Larimer et al. 2012). This intervention is both very brief (only one session) and cost effective. Results also provide insight into how certain mental health symptoms can be addressed by reducing problems experienced as a result of gambling. Although further studies are needed to assess how gambling and mental health issues reciprocally influence each other, the current data suggest that interventions such as a PFI can have over-arching effects on multiple issues facing college students.

Limitations

Several limitations should be considered when interpreting the results from this study. First, there are key differences between the PFI and CBI groups, such as the group versus individual format, which may have accounted for the non-significant findings within the CBI condition. However, due to the different formats of the two interventions, the current study is unable to discern to which factors these differences can be attributed. Furthermore, the results from this study are from a 6-month follow-up, and it is uncertain if changes in mental health symptoms were retained longer-term. Finally, due to the simultaneous measurement of our outcome and mediator variables, it is not possible to determine directionality with our meditational model.

It is also important to consider the sample size as well as characteristics of the sample before generalizing the findings to other college students, or the general population. It is possible that having a larger sample size could provide future studies with increased power to examine interaction effects between mental health and gambling problems. Additionally, our sample was limited in ethnic diversity and therefore may not be generalizable to a more diverse population.

Future Directions

Although these results carry promising clinical implications, there remain many unanswered questions about college student gambling and mental health. Overall, it is important for future research to continue informing our understanding of comorbidity within disordered gamblers. It remains largely unknown how mental health symptoms might

perpetuate gambling, or how gambling may affect mental health, among college students, or what differences in disordered gambling might exist between students with or without comorbid diagnoses. The results from this study suggest that reduction in gambling problems is related to decreased negative affect, but it is also important for research to examine how other factors such as coping or social support might moderate this effect. Moreover, since the current interventions were not specifically tailored to address mental health symptoms comorbid with gambling, future research could tailor interventions which may enhance efficacy (Geisner et al. 2006; Whiteside et al. 2010) and should continue to evaluate brief interventions for gambling and mental health for college students in order to determine the most efficient and effective way to address multiple outcomes. By understanding the mechanisms that account for these changes (i.e. reductions in symptoms), treatment providers can begin to systematically hone in on the most effective treatment methods for co-occurring disordered gambling and mental health issues.

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