People with gambling disorder and risky alcohol habits benefit more from motivational interviewing than from cognitive behavioral group therapy

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Background. Effective psychological treatment, including cognitive behavioral therapy and motivational interviewing (MI), is available for people with problematic gambling behaviors. To advance the development of treatment for gambling disorder, it is critical to further investigate how comorbidity impacts different types of treatments. The purpose of this study was to investigate whether screening for risky alcohol habits can provide guidance on whether people with gambling disorder should be recommended cognitive behavioral group therapy (CBGT) or MI. **Methods.** The present study is a secondary analysis of a previous randomized controlled trial that compared the effects of CBGT, MI and a waitlist control group in the treatment of disordered gambling. Assessment and treatment was conducted at an outpatient dependency clinic in Stockholm, Sweden, where 53 trial participants with gambling disorder began treatment. A modified version of the National Opinion Research Centre DSM-IV Screen for gambling problems was used to assess gambling disorder. The Alcohol Use Disorders Identification Test (AUDIT) was used to screen for risky alcohol habits. **Results.** The interaction between treatment and alcohol habits was significant and suggests that patients with gambling disorder and risky alcohol habits were better helped by MI, while those without risky alcohol habits were better helped by CBGT. **Conclusions.** The results support a screening procedure including the AUDIT prior to starting treatment for gambling disorder because the result of the screening can provide guidance in the choice of treatment. Patients with gambling disorder and risky alcohol habits are likely to be best helped if they are referred to MI, while those without risky alcohol habits are likely to be best helped if they are referred to CBGT.

1 **People with gambling disorder and risky alcohol habits benefit more from motivational**

2 **interviewing than from cognitive behavioral group therapy**

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Introduction

Worldwide, .3% to 5.3% of adults suffer from gambling problems (Wardle et al., 2010).

Disordered gambling is a diagnosis described in the Diagnostic and Statistical Manual of Mental

Disorders, 5th edition (DSM-5; American Psychiatric Association, 2013), as a persistent and

recurrent problematic gambling behavior leading to clinically significant impairment or distress.

The diagnosis shares several characteristics with substance-related disorders. Common features

include preoccupation, increased tolerance, loss of control, withdrawal symptoms, and family

and job disruption (American Psychiatric Association, 2013).

Meta-analyses and systematic reviews have provided evidence for the efficacy of psychological

treatment for gambling disorder (Gooding &Tarrier, 2009; Hodgins, Stea & Grant, 2011;

Yakovenko et al., 2015). Results from a meta-analysis revealed that various forms of cognitive

behavioral therapy (CBT) and motivational interviewing (MI) showed large and significant

effect sizes in the 0–3-months period post treatment, with enduring effects at the 24-month (or

later) follow-up (Gooding &Tarrier, 2009). Effect sizes were highly significant despite

variability in the populations being treated, severity of gambling problem, and type of gambling

(Gooding &Tarrier, 2009).

It is well known that gambling disorder is highly comorbid with other psychiatric disorders

(Bischof et al., 2013; Lorains, Cowlishaw & Thomas, 2011; Petry, Stinson & Grant, 2005). Data

derived from a large national sample in the United States indicate that the most frequently

reported lifetime comorbid condition among people with gambling disorder was alcohol use

disorder (73.2%; Petry, Stinson & Grant, 2005); the corresponding figure in a large German

38   study was 61.7% (Bischof et al., 2013). What is even more interesting from a clinical perspective

39   is that the results of a recent review on co-morbidity among gamblers seeking treatment for their

40   gambling problems point in the same direction, with rates of current alcohol use disorders at

41   21.2% (Dowling et al., 2015). Gamblers' alcohol consumption while gambling and the effect of

42   alcohol on their gambling behavior are of particular interest. Most regular video lottery terminal

43   (VLT) gamblers (73%) said that they prefer to drink alcoholic beverages while gambling

44   (Stewart et al., 2002), and up to 80% of gamblers without a gambling disorder diagnosis reported

45   a consumption of four to ten alcoholic drinks during their last gambling session (Baron &

46   Dickerson, 1999). In other words, gamblers often drink while gambling, and it has been shown

47   that those who do tend to engage in more risky gambling behaviors (Cronce & Corbin, 2010;

48   Ledgerwood et al., 2009). People with gambling disorder and co-occurring alcohol use disorders

49   reported greater levels of problematic gambling (Welte et al., 2004) and were more likely to have

50   psychiatric comorbidity than those without alcohol use disorders (Abdollahnejad, Delfabbro &

51   Denson, 2014). Gamblers with alcohol problems are also at an increased risk of relapse after

52   quitting gambling (Hodgins & El-Guebaly, 2010).

53

54   In a study that mapped the drinking patterns of people with gambling disorder, entry into

55   gambling treatment was temporally associated with reduction in alcohol use, but gamblers with

56   risky alcohol habits were still less likely to adhere to gambling treatment (Rash, Weinstock &

57   Petry, 2011). One study suggested that alcohol problems were linked to poor compliance in

58   individual CBT treatment for gambling disorder (Milton et al., 2002). The study reported that

59   people with gambling disorder comorbid with alcohol problems were 2.5 times more likely to

60   drop out of treatment than people with gambling disorder without alcohol problems (Milton et

61 al., 2002). This result has failed to be replicated in subsequent research on individual CBT

62 (Leblond, Ladouceur & Blaszczynski, 2003) and multimodal CBT (Stinchfield, Kushner &

63 Winters, 2005). Reports on the relationship between alcohol problems and dropout in the

64 treatment of gambling disorder are of clinical interest, but there is no research on how co-morbid

65 conditions such as alcohol problems affect the outcome of patients who actually pursue and

66 remain in treatment for gambling disorder. Neither is there any research on whether different

67 treatment forms, such as CBT and MI, differ in sensitivity to co-occurring alcohol problems. To

68 advance the development of treatment for gambling disorder, it is critical to investigate further

69 how comorbidity impacts different types of treatments for gambling disorder (Dowling et al.,

70 2015; Hodgins, Stea & Grant, 2011; Petry, Stinson & Grant, 2005).

71

72 Because an alcohol use disorder is the most common comorbid condition among people with

73 gambling disorder (Bischof et al., 2013 Dowling et al., 2015; Petry, Stinson & Grant, 2005) and

74 contributes to a loss of control over gambling (Cronce & Corbin, 2010; Ledgerwood et al.,

75 2009.), more severe gambling problems (Welte et al. 2004), higher rates of psychiatric

76 comorbidity (Abdollahnejad, Delfabbro & Denson, 2014), impaired adherence to gambling

77 treatment (Milton et al., 2002; Rash, Weinstock & Petry, 2011), and an increased likelihood of

78 gambling (Hodgins & El-Guebaly, 2010), it is of great clinical interest to see whether the

79 condition has different affects on the outcome of widely used therapies, such as cognitive

80 behavioral group therapy (CBGT) and MI. The purpose of this study was to investigate whether

81 screening for risky alcohol habits can provide guidance on whether people with gambling

82 disorder should be recommended CBGT or MI. The analysis in the present study is based on a

83 data set from a previous randomized controlled trial that compared the effects of CBGT, MI, and

84   a waitlist control in the treatment of gambling disorder (Carlbring et al., 2010). At baseline the

85   three randomized groups had no significant differences in gambling-related measures, levels of

86   depression, or alcohol consumption. In the trial the CBGT and MI groups showed greater

87   reductions in the symptoms of gambling disorder than the no-treatment control group. Both

88   CBGT and MI generated significant within-group decreases on gambling-related outcome

89   measures up to the 12-month follow-up. However, no differences in outcome measures were

90   found between CBGT and MI at any point (Carlbring et al., 2010).

91

92   **Methods**

93   *Design*

94   The present study is a secondary analysis of a previous randomized controlled trial that

95   compared the effects of CBGT, MI, and a waitlist control in the treatment of gambling disorder

96   (Carlbring et al., 2010). The study was approved by the regional ethics committee in Stockholm

97   (2005/5:5), and informed written consent was collected from each participant.

98

99   *Recruitment and Participants*

100   Between June 2005 and December 2006, 80 people with gambling disorder began treatment at an

101   outpatient dependency clinic in Stockholm, Sweden. A total of 53 trial participants were

102   included in the present study. Reasons for exclusion were not providing baseline data ($n = 2$) and

103   not providing data at the 6-month treatment follow-up ($n = 25$). Participants received two cinema

104   tickets for participating in the treatment follow-up.

105

106   *Diagnostic and data collection procedures*

107   Prior to starting treatment, all participants went through a 60- to 90-minute in-person interview

108   conducted by a clinical psychologist trained in the assessment procedures. The interview

109   included demographic questions and a set of self-report measures, including the National

110   Opinion Research Centre DSM-IV Screen for gambling problems (NODS; Gerstein et al., 1999),

111   the Timeline Followback (TLFB) calendar (Weinstock, Whelan & Meyers, 2004) and the

112   Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 2001). The participants were

113   asked to fill out the set of self-report measures again at the 6-month follow-up.

114

115   ***Measures***

116   The NODS (Gerstein et al., 1999), modified to assess gambling at one month instead of one year,

117   was used to assess gambling disorder. The use of the 1-month version of the instrument has not

118   seemed to affect the instrument's reliability or validity. A comparison of the internal consistency

119   between the NODS lifetime, past-year. and 3-month versions has shown Cronbach's alphas of

120   .86, .87, and .87 respectively (Wulfert et al., 2005). The total score, ranging from 0 to 10, is

121   normally used to identify pathological gambling (scores 5 and above) according to DSM-IV

122   (American Psychiatric Association, 2000). The instrument was modified to assess gambling

123   disorder according to DSM-5 by eliminating the illegal acts criterion and lowering the threshold

124   for diagnosis to 4 criteria of a possible 9. Recent research indicates that the increased sensitivity

125   of the DSM-5 gambling disorder diagnosis successfully identifies a broader group of gamblers

126   with clinically significant gambling-related problems (Rennert et al., 2014). Participants included

127   in the present study were those assigned with NODS scores of 4 through 9 at baseline. A TLFB

128   calendar (Weinstock, Whelan & Meyers, 2004) was used to assess the number of days gambled

129   in the last 30 days.

130

131 The AUDIT (Babor et al., 2001) was used to assess risky alcohol habits. The instrument is a 10-

132 item multiple-choice self-report inventory with a total score ranging from 0 to 40. Scores of 0–7

133 for men and 0–5 for women (Zone 1) indicate low-risk drinking. Scores of 8–15 for men and 6–

134 13 for women (Zone 2) indicate hazardous and harmful alcohol use. Scores of 16–19 for men

135 and 14–17 for women (Zone III) indicate a medium level of alcohol problems with a probable

136 alcohol-related diagnosis. Finally, scores above 19 for men and 17 for women (Zone IV) indicate

137 a high level of alcohol problems, with a probable alcohol-related diagnosis. The AUDIT

138 accurately assesses the severity of problematic alcohol use behaviors across a wide range of

139 contexts and populations at risk (Allen et al., 1997). When administered as part of a larger

140 battery of tests in a primary care setting, the AUDIT showed test–retest reliability after a 6-week

141 interval with a correlation of $r = .88$ and an internal consistency reliability of $\alpha = .85$ (Daeppen et

142 al., 2000). In the present study AUDIT scores were analyzed in two ways: first with Zones II–IV

143 as three separate categories vs. Zone I (reference) and then as a dichotomized factor with Zones

144 II–IV combined vs. Zone I.

145

146 ***Treatments***

147 The CBGT treatment ($n = 25$) was administered in closed groups conducted as one 3-hour

148 session per week for 8 weeks. The treatment was manualized (Ortiz, 2006) and each session

149 focused on a set theme. The sessions included psychoeducation, exercises, and distribution and

150 follow-up of homework. A recurrent feature throughout the treatment was exercises aimed at

151 reducing the urge to gamble through imaginary exposure and response prevention. The treatment

152 was focused partly on cognitive restructuring and partly on encouraging clients to try alternative

153   behavioral strategies. Another important treatment component dealt with identifying personal

154   high-risk situations for gambling and increasing participants' skills to cope with these situations

155   in a more functional way.

156

157   The MI treatment ($n = 28$) was administered individually in four 50-minute sessions. The first

158   two sessions were one week apart, and the last two sessions followed at three-week intervals, for

159   a total treatment time of 8 weeks—the same as the CBGT condition. The therapists used the MI

160   approach as described by Miller and Rollick in 2002, including showing empathy, eliciting the

161   participant's own reasons for making a change, collaborating with and supporting the participant

162   in autonomy, developing the discrepancy between ongoing problematic behaviors and the

163   participant's internal goals and values, and supporting the participant's confidence in their own

164   abilities. Techniques such as open-ended questions and reflective listening were used throughout

165   the sessions. If the patients were ready to change, they were encouraged to make a decision about

166   changing their gambling behavior and to make a change plan. The therapists had access to a

167   semi-structured manual in which these standard MI principles were described and exemplified in

168   the context of problem gambling (Forsberg, Forsberg & Knifström, 2010).

169

170   ***Treatment fidelity***

171   The therapists administering the CBGT received continuous supervision. All sessions were

172   audio-taped and 20% were randomly selected for coding by an independent licensed clinical

173   psychologist with psychotherapist training and experience in the specific treatment method.

174   According to the treatment manual (Ortiz, 2006) a total of 375 agenda points should be covered.

175   The coding showed 93% adherence to the manual.

176

177 To test MI treatment integrity, all sessions were audio-taped and 20% of the sessions were

178 randomly selected to be coded by independent and blinded coders using the Motivational

179 Interviewing Treatment Integrity Code 2.0 (MITI; Moyers et al., 2003). The MI competency in

180 the delivered sessions was deemed acceptable using the given reference values for MI

181 proficiency in the coding manual (Moyers et al., 2003). Supervision of the MI treatment was

182 accomplished through assessment of the therapists' audio-taped sessions. Results from the

183 coding were used to facilitate specific feedback.

184

185 ***Statistical analyses***

186 Analyses were conducted using SPSS 22.0 and STATA 14.0. Independent *t*-tests and Chi-square

187 tests were used to determine whether the two treatment groups differed in pre-treatment

188 characteristics. The same test statistics were also used to investigate whether participants who

189 were lost at follow-up ($n = 25$) differed in pre-treatment characteristics from participants who

190 completed the follow-up measurements. Analysis of covariance (ANCOVA) of the NODS scores

191 and number of gambling days in the last 30 days at the 6-month follow-up was used, with the

192 NODS scores and number of gambling days in the last 30 days at pre-treatment used as the

193 models' quantitative control variables. The final two models (one for NODS scores and the other

194 for number of gambling days) had two factors, treatment (MI vs. CBGT) and AUDIT (risky vs.

195 not risky alcohol habits), with an interaction term included in the models. Marginal means were

196 calculated from the ANCOVA model and visualized (for the NODS scores) via a bar-plot of the

197 margins. To assess the difference in NODS scores between the CBGT and the MI treatment

198 adjusted for alcohol habits, contrasts of discrete marginal effects were estimated and tested.

199

200 **Results**

201 *Pre-treatment variables*

202 Table 1 shows baseline point estimates and the distribution of some basic characteristics of the

203 participants (*n* = 53). No statistically significant differences in characteristics were found

204 between the two treatment groups.

205

206 _____

207 **Insert Table 1 about here**

208 _____

209 *NODS scores at 6-month follow-up*

210 The interaction between treatment and alcohol habits in the ANCOVA-model was significant [F

211 (1, 48) = 5.39; *p* = .025], and suggests that the effect of treatment depends on the patient's

212 alcohol habits. Although none of the factors in Table 1 differed significantly between treatment

213 groups, we adjusted the model for gender, age, minority status, income level, gambling debts,

214 and treatment attendance and found that none of these variables markedly changed the main

215 estimates. Therefore, only the unadjusted estimates are presented. Marginal means calculated

216 from the ANCOVA model showed that patients with gambling disorder and risky alcohol habits

217 who received MI treatment had a mean NODS score of 1.9 at the 6-month follow-up. As the low

218 average NODS score suggests, a strikingly large proportion (81.8%) of the participants in this

219 group no longer met the criteria for gambling disorder at the 6-month follow-up. For patients

220 with gambling disorder and risky alcohol habits who received CBGT, the corresponding NODS

221 score was 4.0, with a lower proportion of participants (30.0%) who no longer met the criteria for

222   gambling disorder at follow-up. The contrasts between MI and CBGT, shown in Figure 1, were

223   significantly different between participants with no risky alcohol habits and participants with

224   risky alcohol habits [t (48) = 2.32; p = .025].

225

226   _____

227   **Insert Figure 1 about here**

228   _____

229

230   To confirm the results for the NODS scores, we used the same ANCOVA model with the

231   number of gambling days per month as outcome measure. Unfortunately, there were only 39

232   observations for this outcome measure compared with 53 observations for the NODS scores,

233   which might explain why no results from these analyses became significant. However, among

234   participants in Zone I (alcohol habits), the means and standard deviations were 11.34 (1.87) for

235   the MI treated and 8.86 (2.73) for those treated by CBGT. Among participants in Zones II–IV,

236   the mean and standard deviations were 5.14 (3.45) for the MI treated and 11.18 (2.57) for those

237   treated by CBGT. In other words, the results for number of gambling days were in line with the

238   result for the NODS scores. These results suggest a better treatment outcome for CBGT than for

239   MI among participants in Zone I and a better treatment outcome for MI than for CBGT among

240   participants in Zones II–IV. In the first analysis that was performed, the AUDIT scores were

241   analyzed with Zones II–IV as three separate categories compared with Zone I (reference). The

242   risk estimate for Zone III versus Zone I was higher than the risk estimate for Zone II versus Zone

243   I.

244

245 *Analyses of missing data*

246 There were 25 patients who did not participate in the 6-month follow-up, equally distributed

247 between the two treatment groups, CBGT (n = 13) and MI (n = 12). There were no statistically

248 significant differences (no *p*-values lower than .40) in terms of sex, age, or pretreatment scores

249 on NODS and AUDIT between those who participated in the 6-month follow-up and those who

250 did not.

251

252 **Discussion**

253 The findings in this study suggest that patients with gambling disorder respond differently to

254 CBGT and MI depending on whether or not they have risky alcohol habits at pre-treatment.

255 Patients with gambling disorder who also have risky alcohol habits appear to have a better

256 chance of benefitting from MI, and patients with no risky alcohol habits appear to have a better

257 chance of benefitting from CBGT. The results are clinically relevant because they can be used to

258 facilitate the referral of patients with gambling disorder to the treatment that will help them the

259 best. These findings raise the question of why MI appears to be more efficient than CBGT in

260 treating patients with gambling disorder and risky alcohol habits, and why CBGT appears to be

261 more efficient when patients do not have risky alcohol habits.

262

263 In a recent study on the personality traits of people with gambling problems with and without

264 alcohol dependence, individuals with gambling disorder and co-occurring lifetime alcohol

265 dependence reported a personality style characterized by resistance to externally motivated

266 treatment approaches (Lister, Milosevic & Ledgerwood, 2015). In MI, patient behaviors

267 characterized by resistance have been a focus of treatment, and such resistant behavior might be

268   better addressed by MI than CBGT treatment. MI is a non-authoritarian, collaborative method

269   that focuses on building intrinsic motivation (Miller & Rollick, 2013). The individually

270   administered MI also offers more opportunities to tailor treatment to patient needs. MI is a

271   compassionate treatment during which the patient is likely to feel comfortable raising personal

272   issues (Miller & Rollick, 2013) that may pose obstacles to treatment if they are not given space.

273   Risky alcohol habits could be addressed in MI treatment if it would help the patient to move

274   towards the change goal, to stop or reduce gambling. The advantage of being able to address

275   multiple behavior targets in MI treatment may have had a significant impact on the outcome

276   because the two addictive behaviors are likely to trigger, reinforce, and maintain each other.

277   Alcohol is usually readily available at casinos, racetracks. and other gambling environments, and

278   gambling under the influence of alcohol is associated with higher risk-taking (Cronce & Corbin,

279   2010; Ledgerwood et al., 2009). Conversely, events that occur during gambling (e.g., winning

280   and losing) may trigger alcohol consumption (Zack et al., 2005). Multiple behavior targets in MI

281   treatment have been studied in other fields of addiction, and have proven to be effective in

282   motivating people to simultaneously reduce their usage of tobacco, alcohol, and cannabis

283   (McCambridge & Strang, 2004). In a review on smoking cessation during substance abuse

284   treatment, Baca and Yahne (2009) concluded that targeting smoking cessation enhances outcome

285   success and reduces substance use.

286

287   An additional advantage of the MI treatment over CGBT is that risky alcohol habits might have

288   the same origins as the gambling disorder (Stewart et al., 2008). The MI therapist is therefore

289   able to address risky alcohol habits in the treatment of gambling disorder, and the reasons for

290   both alcohol consumption and gambling could then be highlighted and tackled from different

291   angles.

292

293   In the CBGT treatment, on the other hand, the possibility of tailoring treatment to fit any

294   comorbid conditions is very small because the treatment is in a group format and strictly follows

295   a manual (Ortiz, 2006). The superior effect of CBGT on patients who did not have risky alcohol

296   habits can probably be explained by the fact that CBGT was an extensive treatment that included

297   a wide range of psychoeducative elements, exercises, and homework assignments that all

298   addressed various aspects of problem gambling (Ortiz, 2006)

299

300   ***Strengths and limitations of the study***

301   The major strength of this study is that it addresses the important issue of moderators of

302   treatment effects. It highlights a factor that is highly correlated to gambling disorder and appears

303   to moderate the outcome of treatment. The two treatment arms compared were evidence-based

304   effective treatment methods for gambling problems, and treatment outcome was measured six

305   months post-treatment, which implies that the results were persistent. The potential moderator

306   (risky alcohol habits) included in the analysis was selected for two main reasons. First, it is the

307   most common comorbid condition among people with gambling disorder (Bischof et al., 2013;

308   Petry, Stinson & Grant, 2005); second, earlier findings indicate that the condition is an

309   aggravating factor in treatment that correlates with impaired adherence to treatment (Milton et

310   al., 2002; Rash, Weinstock & Petry, 2011), and increased risk of gambling relapse (Hodgins &

311   El-Guebaly, 2010).

312

313   A limitation of this study is the small sample size, which made it difficult to include additional

314   potential moderating variables in the model that would have been interesting to analyze.

315   Additional potentially predictive comorbid conditions, such as drug use, mood, anxiety, and

316   personality disorders should be included in future research. Unfortunately, a large number of

317   patients dropped out at follow-up and were excluded from the analysis. This makes it necessary

318   to be cautious in interpreting the results. The modified version of the NODS (assessing gambling

319   at one month instead of one year) has not been evaluated. However, shortening the window of

320   time from one year to 3 months does not appear to affect the instrument's reliability or validity

321   (Wulfert et al., 2005). Moreover, an apparent benefit of a shorter-term version of the NODS is

322   that it can serve as a convenient treatment outcome measure. Another limitation is that it is

323   unclear to what extent these results can be explained by different modes of treatment (individual

324   vs. group) and to what extent they can be explained by unique factors inherent in each treatment.

325   A final limitation is that there was no control group. It is therefore unknown whether the

326   participants' reported reductions of symptoms of gambling disorder during the 6-month post

327   treatment period were the results of the treatment or spontaneous recovery. About one third of

328   individuals with gambling problems are believed to recover without formal treatment (Slutske,

329   2006). However, we have no reason to believe that the rate of spontaneous recovery should be

330   different between treatment groups.

331

332

333   ***Generalizability***

334   There were missing data at the 6-month follow-up. However, there were no statistically

335   significant differences between those who participated and those who did not participate in the

336   follow-up in terms of sex, age, severity of problem gambling, and alcohol problems at baseline.

337   It appears reasonable to conclude that it is possible to generalize the findings to gamblers seeking

338   treatment for gambling problems serious enough to meet the criteria for gambling disorder. The

339   findings are interesting from a health-planning perspective, and are valid for both CBGT and MI,

340   which are two commonly used evidence-based treatments for gambling disorder (Gooding &

341   Tarrier, 2009; Hodgins, Stea & Grant, 2011; Yakovenko et al., 2015)

342

343   *Future research*

344   First, the results from this study need to be replicated to ensure that these associations are not

345   sample-specific. In order to confirm our results, future studies should state a priori the hypothesis

346   that people with gambling disorder and risky alcohol habits will benefit more from MI than from

347   CBGT, and that people with gambling disorder but no risky alcohol habits will be helped more

348   by CBGT than by MI. Further research would improve the validity of the findings if an

349   intention-to-treat analysis were conducted. Moreover, further research is needed to investigate

350   how other comorbid conditions, such as depression and anxiety, affect the efficacy of treatment.

351   It would also be useful to learn more about the impact of comorbidity on individual CBT.

352

353   **Conclusions**

354   The results support a screening procedure including the AUDIT prior to the start of treatment for

355   gambling disorder because the result of the screening can provide guidance in the choice of

356   treatment. Patients with gambling disorder and risky alcohol habits are more likely to be helped

357   if they are referred to MI treatment, while those without risky alcohol habits are likely to be best

358   helped if they are referred to CBGT.

359

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Table 1. Participants' characteristics at pre-treatment including 95% confidence interval (CI95%)

Characteristics	CBGT ($n = 25$)		MI ($n = 28$)		p-value
	Mean	CI95%	Mean	CI95%	
NODS *No risky alcohol habits*	6.1	5.1 – 7.2	6.0	5.1 – 6.9	.84
	6.2	5.3 – 7.1	5.7	5.1 – 6.3	.33
NODS *Risky alcohol habits*					
AUDIT *No risky alcohol habits*	2.2	.9 – 3.5	3.6	2.3 – 4.9	.11
AUDIT *Risky alcohol habits*	15.7	12.3 – 19.1	16.1	8.8 – 23.4	.92
AUDIT-C	4.1	2.7 – 5.5	4.1	2.9 – 5.2	.99
BDI	25.8	20.0 – 31.7	25.6	20.7 – 30.5	.95
BAI	18.8	13.4 – 24.2	18.0	14.0 – 21.9	.81
Age	43.0	37.5 – 48.4	40.8	35.9 – 45.6	.53
Gambling debt, 1000 USD	10.2	5.2 – 15.3	8.7	4.0 – 13.4	.65

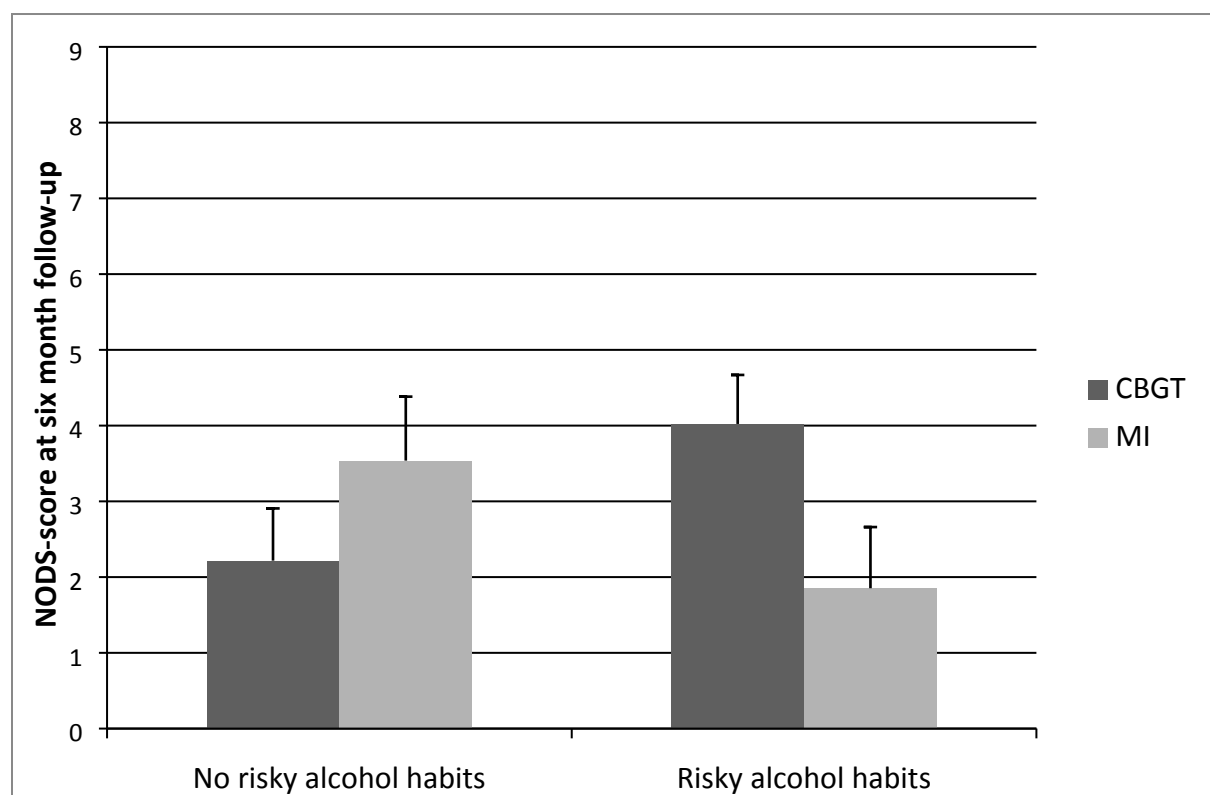|	Proportion	Proportion	p-value
Female	20.0	17.9	.84
Prior gambling treatment	40.0	46.4	.64
Prior psychiatric treatment	44.0	57.1	.34
Only elementary school	32.0	32.1	.99
Immigrant	24.0	39.3	.23
Unemployed	16.0	14.3	.86
Low income	16.0	21.4	.61
Primary gambling on:			
Video lottery terminals	56.0	46.4	.49
Horse/sport betting	16.0	25.0	.42
Casino/poker	12.0	10.7	.88
Other	16.0	17.9	.86

Figure 1. Marginal means and standard errors for interaction effects between treatment and alcohol habits