Internet gambling: an emerging concern in family practice medicine?

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Background. Gambling problems are rarely brought to the attention of family practice physicians, but pathological gambling can be associated with poor emotional and physical health. Recent availability and easy accessibility of Internet gambling may be associated with pathological gambling status, and Internet gambling may confer health risks.

Objective. This study evaluated the prevalence of Internet gambling, its association with pathological gambling, and the relationship between Internet gambling and health status among patients attending medical and dental clinics.

Methods. The South Oaks Gambling Screen and Short Form 12 were administered to 1414 adults in waiting areas of clinics.

Results. Only 6.9% of respondents reported ever gambling on the Internet, with 2.8% indicating frequent Internet wagering. Almost two-thirds (65.9%) of regular Internet gamblers were classified as probable pathological gamblers, compared with 29.8% of ever-Internet gamblers and 7.6% of non-Internet gamblers. Internet gambling was associated with poor mental and physical health, and this association remained significant even after controlling for age, gender, site and pathological gambling status.

Conclusions. These data suggest that Internet gambling is linked to pathological gambling and is independently associated with poor health. Family practice physicians should consider referring patients who gamble on the Internet for further treatment.

Keywords. Global health status, Internet gambling, pathological gambling.

Pathological gambling is an impulse-control disorder characterized by preoccupation with gambling, a need to bet more, ‘chasing’ lost money and continued gambling in spite of escalating negative consequences.1 According to recent community-based surveys, prevalence rates of pathological gambling range from 0.4 to 1.9% in countries throughout the world.2–13

Gambling participation appears to have increased as a result of legalization and availability of gambling opportunities.9 One type of gambling that is now widely available throughout the world, even without legalization, is Internet gambling. Estimates indicate that 75% of Americans have access to the Internet, and 65.1% of homes are now connected to the Internet, up from 46.9% in 2000.14 Concern about Internet gambling is growing in many countries,15 but little empirical data exist about the rates of participation in Internet gambling or its psychosocial and medical correlates.

A growing body of literature indicates that pathological gambling, regardless of the preferred form of gambling activities, is associated with financial difficulties, family distress and psychiatric problems.4,16–18 For example, the recent National Epidemiological Survey of Alcohol and Related Conditions conducted among over 43 000 nationally representative respondents in the United States found that pathological gambling was associated with increased risk of every psychiatric condition assessed, even after controlling for demographic characteristics that may be linked to those disorders.7

Pathological gambling also appears to be related to poor health. National surveys in the United States4 and studies interviewing patients in waiting rooms of doctors’ offices19 find that those identified with pathological gambling have poorer general health than those who are not pathological gamblers. Although the specific health consequences are not yet well...
delineated, they may include stress-related disorders, circulatory disease and gastrointestinal distress.\textsuperscript{20–22} Unfortunately, much remains to be learned about gambling and health functioning in medical settings as most prior studies evaluated health functioning with a one-item question, without well-defined psychometric properties. Gambling on the Internet, a sedentary and isolating activity, may be particularly high risk for physical and mental health problems.

One purpose of this study was to evaluate participation rates of Internet gambling in a large sample of patients receiving general medical and dental treatment. This population was selected for the study sample because of the association between gambling and health, and because family practitioners and dentists often follow patients long term. Ultimately, brief interventions may be targeted toward such populations and settings.

Another purpose of the study was to compare Internet gamblers and non-Internet gamblers with respect to prevalence rates of pathological gambling and medical and emotional health indices. One hypothesis was that individuals who reported Internet gambling, especially those indicating more substantial involvement in this type of betting, would evidence high rates of pathological gambling behaviors. A second hypothesis was that Internet gambling would be associated with poor physical and emotional health.

Method

Participants

Participants ($n = 1414; 70.0\%$ female) were adults in waiting areas at medical and dental clinics located in the greater Hartford, CT, USA, metropolitan area between July 2003 and August 2004. Both clinics served primarily underprivileged and often uninsured populations. The study was approved by the University and Hospital Institution Review Boards, and a waiver of written informed consent procedures was obtained because no identifying information was collected and risks associated with study participation were low.

Procedures

A research assistant approached individuals attending these sites and asked them to complete a 3-page questionnaire. Although specific information on study refusals was not collected, over 80\% of individuals approached for the survey agreed to participate. An additional 12 screens (<1\%) were only minimally completed (e.g. most all responses, or the item about Internet gambling, not filled in) and were therefore excluded from analyses.

Measures

The questionnaire included items about basic demographics, lifetime participation in Internet gambling and the South Oaks Gambling Screen (SOGS).\textsuperscript{23} The SOGS contains 20 items inquiring about lifetime gambling problems, and scores range from 0 to 20 depending on how many items are affirmatively endorsed. Scores of 5 or higher are indicative of probable pathological gambling.\textsuperscript{23} Using a cutoff of 5, the hit rate is 0.98, sensitivity is 0.95, specificity is 0.996, false-positive rate is 0.004 and false-negative rate is 0.05.\textsuperscript{24} Test-retest reliability of the instrument is 0.71.\textsuperscript{23} Cronbach’s alpha internal consistency in this sample was 0.892.

Version 2 of the Short Form Health Survey (SF-12v2), based on the Short Form 36, was also included in the questionnaire. It is a widely used, reliable and valid measure of global physical and emotional health over the past 4 weeks\textsuperscript{25} with lower scores indicative of more severe problems. In this sample, internal consistency of the physical health items was 0.864 and 0.842 for the mental health items.

Data analysis

Participants were classified into one of three categories based on responses to the item assessing frequency of Internet gambling in one’s lifetime: never, 1–10 times or more than 10 times. Differences among groups with respect to demographic characteristics were assessed using chi-square tests for categorical data and ANOVA for continuous data.

Multivariate analyses evaluated group differences on SF-12v2 summary scores. In these analyses, the two global indices of health (physical and emotional) were considered the dependent variables; age, gender, recruitment site and pathological gambling status were included as independent variables. Age was entered as a continuous weighted variable, and all others were entered as dichotomous measures. Because no interaction terms (e.g. site by frequency of Internet gambling participation, gender by site, etc.) were significantly associated with SF-12v2 scores, the model presented includes only main effects of each independent variable for ease of interpretation. When statistically significant differences in SF-12v2 summary scores were noted, subsequent post hoc Student Newman Keuls tests evaluated differences on scores between the groups. These post hoc tests are protected against multiple comparisons.\textsuperscript{26}

Data were analyzed using SPSS. Two tailed alphas <0.05 were considered statistically significant.

Results

Overall, 1316 (93.1\%) of the participants had never wagered on the Internet. Fifty-seven individuals (4.0\%) reported trying Internet gambling between 1 and 10 times. Nineteen persons (1.3\%) reported Internet gambling more than 10 times but never as frequently as weekly, 9 (0.6\%) reported weekly or more frequent yet less than daily Internet gambling, and 13 (0.9\%)
reported daily Internet gambling. Participants endorsing any of these last three categories \((N = 41)\) were combined into one group, consisting of persons who gambled on the Internet more than 10 times.

As shown in Table 1, the three groups were fairly similar in terms of many demographic characteristics. However, Internet gamblers were more likely to be male and younger than non-Internet gamblers. Internet gamblers, especially more frequent Internet gamblers, were also more likely to endorse lifetime gambling problems than non-Internet gamblers, as noted by higher SOGS scores and greater proportions scoring in the probable pathological gambling range on this instrument.

In the multivariate analyses, gender, site and pathological gambling status were all significantly associated with the two SF-12v2 summary scores, \(F(2,1292) = 6.05, 4.55, \text{ and } 52.71, \text{ respectively, all } P's <0.05\). Women had lower physical health scores than men, indicating worse functioning (means and standard errors of 46.5 ± 0.9 and 48.6 ± 1.0, respectively, \(P < 0.01\)). However, gender was not related to mental health scores. Participants recruited from the dental clinic had lower mental health scores than those recruited from the medical clinic, with scores of 40.4 ± 0.9 and 42.2 ± 0.9, \(P < 0.01, \text{ respectively}; \text{ the two recruitment sites did not differ in terms of physical health scores} \ (P > 0.20). \text{ Probable pathological gamblers (regardless of whether they were Internet gamblers or not) had significantly lower physical and mental health scores than non-pathological gamblers} \ (P's < 0.001). The mean score of probable pathological gamblers on the physical summary scale was 43.3 ± 1.1

### Table 1 Demographic characteristics of never, occasional and regular Internet gamblers

<table>
<thead>
<tr>
<th></th>
<th>Never gambled on Internet</th>
<th>Tried Internet gambling</th>
<th>Gambled on Internet &gt;10 times</th>
<th>Statistic (d.f.)</th>
<th>(P)-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruitment site, % (N)</td>
<td></td>
<td></td>
<td></td>
<td>(\chi^2(2) = 5.31)</td>
<td>0.07</td>
</tr>
<tr>
<td>Medical clinic</td>
<td>44.6% (587)</td>
<td>33.3% (19)</td>
<td>31.7% (13)</td>
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<tr>
<td>Dental clinic</td>
<td>55.4% (729)</td>
<td>66.7% (38)</td>
<td>68.3% (28)</td>
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<tr>
<td>Age</td>
<td>38.4 ± 14.8</td>
<td>31.7 ± 11.8</td>
<td>33.9 ± 11.7</td>
<td>(F(2,1366) = 7.10)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Female, % (N)</td>
<td>70.8% (909)</td>
<td>55.6% (30)</td>
<td>63.4% (26)</td>
<td>(\chi^2(2) = 6.66)</td>
<td>0.04</td>
</tr>
<tr>
<td>Ethnicity, % (N)</td>
<td></td>
<td></td>
<td></td>
<td>(\chi^2(10) = 8.37)</td>
<td>0.50</td>
</tr>
<tr>
<td>Caucasian</td>
<td>32.7% (426)</td>
<td>33.9% (19)</td>
<td>35.0% (14)</td>
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<tr>
<td>African-American</td>
<td>38.3% (499)</td>
<td>32.1% (18)</td>
<td>40.0% (16)</td>
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<tr>
<td>Hispanic</td>
<td>23.7% (308)</td>
<td>26.8% (15)</td>
<td>25.0% (10)</td>
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</tr>
<tr>
<td>Native American</td>
<td>1.4% (18)</td>
<td>1.8% (1)</td>
<td>0.0% (0)</td>
<td></td>
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<tr>
<td>Asian</td>
<td>0.8% (10)</td>
<td>3.6% (2)</td>
<td>0.0% (0)</td>
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<tr>
<td>Other</td>
<td>3.1% (41)</td>
<td>1.8% (1)</td>
<td>0.0% (0)</td>
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<td></td>
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<tr>
<td>Current employment status, % (N)</td>
<td></td>
<td></td>
<td></td>
<td>(\chi^2(8) = 8.91)</td>
<td>0.35</td>
</tr>
<tr>
<td>Full time</td>
<td>42.7% (497)</td>
<td>41.5% (22)</td>
<td>44.4% (16)</td>
<td></td>
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</tr>
<tr>
<td>Part time</td>
<td>24.3% (283)</td>
<td>35.8% (19)</td>
<td>25.0% (9)</td>
<td></td>
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</tr>
<tr>
<td>Disability</td>
<td>20.8% (242)</td>
<td>15.1% (8)</td>
<td>27.8% (10)</td>
<td></td>
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</tr>
<tr>
<td>Retired</td>
<td>9.3% (108)</td>
<td>3.8% (2)</td>
<td>2.8% (1)</td>
<td></td>
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</tr>
<tr>
<td>Unemployed</td>
<td>2.8% (33)</td>
<td>3.8% (2)</td>
<td>0.0% (0)</td>
<td></td>
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<tr>
<td>Current marital status, % (N)</td>
<td></td>
<td></td>
<td></td>
<td>(\chi^2(6) = 8.43)</td>
<td>0.21</td>
</tr>
<tr>
<td>Married or cohabitating</td>
<td>33.8% (442)</td>
<td>21.1% (12)</td>
<td>31.7% (13)</td>
<td></td>
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</tr>
<tr>
<td>Divorced or separated</td>
<td>18.7% (224)</td>
<td>15.8% (9)</td>
<td>24.4% (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single (never married)</td>
<td>42.9% (561)</td>
<td>59.6% (34)</td>
<td>36.6% (15)</td>
<td></td>
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<tr>
<td>Widowed</td>
<td>4.7% (61)</td>
<td>3.5% (2)</td>
<td>7.3% (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yearly income, % (N)</td>
<td></td>
<td></td>
<td></td>
<td>(\chi^2(10) = 7.48)</td>
<td>0.68</td>
</tr>
<tr>
<td>Under $10000</td>
<td>36.4% (437)</td>
<td>35.7% (20)</td>
<td>44.7% (17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$10001–$25000</td>
<td>33.4% (401)</td>
<td>35.7% (20)</td>
<td>21.1% (8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$25001–$50000</td>
<td>22.2% (267)</td>
<td>25.0% (14)</td>
<td>26.3% (10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$50001–$75000</td>
<td>5.7% (68)</td>
<td>1.8% (1)</td>
<td>5.3% (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$75001–$100000</td>
<td>1.9% (23)</td>
<td>0.0% (0)</td>
<td>2.6% (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Over $100000</td>
<td>0.5% (6)</td>
<td>1.8% (1)</td>
<td>0.0% (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of education</td>
<td>12.3 ± 2.6</td>
<td>12.3 ± 2.7</td>
<td>11.8 ± 2.0</td>
<td>(F(2,1285) = 0.65)</td>
<td>0.52</td>
</tr>
<tr>
<td>SOGS score(^a)</td>
<td>0.9 ± 2.3</td>
<td>3.2 ± 3.6</td>
<td>7.6 ± 5.3</td>
<td>(\chi^2(4) = 147.6)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Probable pathological gamblers, % (N)</td>
<td></td>
<td></td>
<td></td>
<td>(\chi^2(2) = 165.62)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Values represent percentages, with \(N\) in parentheses or mean ± SD. Numbers do not always add up to group sample size due to missing responses.

\(^a\) Kruskal–Wallis \(\chi^2\) analyses were used for non-normally distributed data.
compared with 52.0 ± 0.9 for non-pathological gamblers, and 37.3 ± 1.1 versus 44.8 ± 0.9 for the two respective groups on the mental health summary scale.

After controlling for age, gender, site, pathological gambling status, frequency of Internet gambling emerged as a significant and independent predictor of SF-12v2 scores, $F(4,2586) = 3.31, P < 0.01$ (degrees of freedom differ from tests reported above because the Internet gambling participation variable contains three groups, instead of two groups for the other categorical variables assessed). Post hoc Student Newman Keuls analyses revealed that those who had gambled on the Internet more than 10 times had significantly lower physical health summary scores than the infrequent ($P < 0.02$) and never Internet gamblers ($P < 0.02$). Any Internet gambling, even low rates of involvement, was significantly associated with poor mental health. Post hoc tests revealed that the never Internet gamblers had significantly higher scores than both the infrequent ($P < 0.001$) and more frequent ($P < 0.001$) Internet gamblers; the two groups of Internet gamblers did not differ from one another on mental health scores. Figure 1 shows adjusted means on the physical and mental health scores for the groups based on level of involvement with Internet gambling.

**Discussion**

In this sample of over 1000 medical and dental patients, only a small minority (7%) reported ever gambling on the Internet. Another study$^{27}$ conducted in a similar population reported comparable rates of Internet gambling participation. Data from a nationally representative sample drawn from the general population in the United States likewise found very low rates of Internet gambling, with only 8 of over 2000 respondents reporting Internet gambling.$^3$ More recent surveys from Arizona and British Columbia found that only 1.5%$^{28}$ and 2%$^{29}$ of adults reported lifetime and past 12 month Internet gambling, respectively. Despite concerns that Internet gambling is widespread, data from these studies suggest that it is still a relatively rare phenomena, at least in North American samples.

However, the present study, similarly to others$^{27,29}$ found that Internet gambling is closely related to pathological gambling behaviors. Almost half of those who had ever gambled on the Internet in this study were classified as probable pathological gamblers. These data may suggest that either Internet gambling leads to problem gambling behaviors or individuals who gamble problematically are prone to gamble on the Internet. The cross-sectional nature of this study design prevents examination of the directionality of these relationships.

Certain demographic characteristics were associated with Internet gambling participation. Younger age and male gender were related to increased rates of Internet gambling. These same demographic characteristics are also related to pathological gambling in general community samples.$^{17,18}$

Pathological gambling status was associated with poor physical and mental health in these patients, even after controlling for these demographic characteristics. The SF-12v2 is a reliable and valid indicator of global health status$^{25}$ and individuals identified as probable pathological gamblers based upon their SOGS scores had significantly lower scores on both summary scales of this instrument. Other studies have likewise demonstrated the relationship between
Even after controlling for pathological gambling status and demographic characteristics that may impact health, Internet gambling participation was a statistically significant independent predictor of poor mental and physical health. In the case of mental health, any Internet gambling, even non-regular participation, was related to lower scores on the SF-12v2 mental health summary scale. On the physical health summary scale, individuals with only minimal Internet gambling experience scored no differently than non-Internet gamblers. However, individuals who had more substantial Internet gambling involvement scored significantly lower than ever and non-Internet gamblers on the physical health scale of the SF-12v2. This study is the first to link poorer mental and physical health to Internet gambling, but further evaluation is necessary to elucidate specific types of mental and physical problems associated with this type of gambling. The temporal relationship of these problems also remains unclear, as it is not known what comes first: gambling problems, Internet gambling, mental health difficulties or poor physical health.

A number of limitations of this study are noted. The study was conducted in only one state in the United States, and it restricted recruitment to individuals attending medical and dental clinics that served primarily the underprivileged. Rates of pathological gambling may be lower in other areas in which fewer legalized gambling opportunities exist, or among individuals in the general population. Because it is brief and can be self-administered, the SOGS was used to classify individuals as probable pathological gamblers. Nevertheless, this instrument may overestimate rates of pathological gambling relative to DSM-based instruments, hence recommendation of the term ‘probable pathological gambler’. Although rates of pathological gambling may have been lower with other instruments, the SOGS had the most data available on its psychometric properties at the time of this study and it is reliable and valid in assessing pathological gambling.

No items evaluating access to computers or the Internet in general were included in the present questionnaire, and individuals with Internet access in the home may be more likely to report Internet gambling than those who do not have a home computer or home Internet access. Further, the types and recency of Internet gambling were not assessed and may affect results. Response biases may have also impacted these findings, although rates of study refusal were relatively low. Finally, the number of Internet gamblers identified was rather small, thereby reducing power to detect between-group differences. Nevertheless, some statistically significant differences in physical and mental health scores emerged.

In sum, this study demonstrates that, although relatively rare, Internet gambling is associated with emotional distress, even among non-regular Internet gamblers. More substantial involvement with Internet gambling is associated with pathological gambling and has an additive and independent effect on poor physical and emotional health. Future studies are needed to replicate these findings in other populations and to extend evaluation of the specific mental and physical problems associated with Internet gambling. Data from this study suggest that Internet gambling is an especially troublesome activity, and prevention, early intervention and treatment efforts may need to be targeted toward individuals who wager on the Internet. Individuals with gambling problems are unlikely to present for mental health or gambling treatment and therefore, development and evaluation of brief intervention strategies may be useful for reducing some of these problems in the context of family care medicine.

Declaration

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Ethical approval: this study was carried out as approved by University and Hospital Institutional Review Boards.

Conflicts of interest: none.

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