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Electronic gaming machines and gambling disorder: A cross-cultural comparison between treatment-seeking subjects from Brazil and the United States



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ABSTRACT

Aims: The objective of this paper is to perform a cross-cultural comparison of gambling disorder (GD) due to electronic gaming machines (EGM), a form of gambling that may have a high addictive potential. Our goal is to investigate two treatment-seeking samples of adults collected in Brazil and the United States, countries with different socio-cultural backgrounds. This comparison may lead to a better understanding of cultural influences on GD. **Methods:** The total studied sample involved 733 treatment-seeking subjects: 353 men and 380 women (average age=45.80, standard deviation \pm 10.9). The Brazilian sample had 517 individuals and the American sample 216. Subjects were recruited by analogous strategies. **Results:** We found that the Brazilian sample was younger, predominantly male, less likely to be Caucasian, more likely to be partnered, tended to have a faster progression from recreational gambling to GD, and were more likely to endorse chasing losses. **Conclusion:** This study demonstrated that there are significant differences between treatment-seeking samples of adults presenting GD due to EGM in Brazil and in the United States. These findings suggest that cultural aspects may have a relevant role in GD due to EGM.

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1. Introduction

In 2013, there were 7,673,134 Electronic Gaming Machines (EGM) in the world with approximately 852,000 in the United States, an increase of 15,000 units compared to the previous year (Ziolkowski, 2014). Evidence suggests that EGM (such as slots, keno and different kinds of video-bingo) may have a high addictive potential (Tavares et al., 2003; Dowling et al., 2005; Shao et al., 2013). For example, subjects who play EGM tend to have a shorter lag between the beginning of recreational gambling and onset of problems due to gambling relative to individuals that play other games (Shao et al., 2013). Increased availability of EGMs has also been associated with greater severity of gambling problems (Australian Government, 2010; Livingstone and Adams, 2011). This addictive potential is likely associated with the high frequency and high intensity of reinforcements provided by EGM (Tavares et al., 2003; Williams et al., 2007; Dowling et al., 2005; Nower and

Blaszczynski, 2008; Australian Government, 2010). EGM are widely available (Marshall and Baker, 2001; Ladouceur et al., 2005; Delfabbro 2008), even in countries where they are illegal, such as Brazil (Tavares, 2014). EGM generate a significant proportion (about 80%) of revenues in casinos and other betting outlets, which might be explained by this combination of intense addictive potential and large availability (Ghezzi et al., 2000; Shao et al., 2013).

Neurobiological research has provided further clues as to the addictive potential of EGM (Tremblay et al., 2011; Shao et al., 2013). Tremblay et al. (2011) suggest that altered D2 receptor activity mediates the excessive use of EGM (Tremblay et al., 2011), and Shao et al. (2013) demonstrated that a single episode of EGM play engages well-described reinforcement-learning mechanisms mediated by the mesolimbic dopamine pathway (Shao et al., 2013). Socio-cultural factors may also play a role in shaping gambling behavior, particularly in gambling disorder (GD) psychopathology, prevalence, and acceptance (Raylu, Oei, 2004; Okuda et al., 2009; Granero et al., 2009; Dhillon et al., 2011). This raises the question of how, and to what extent, culture influences the relationship between GD and EGM (Tavares et al., 2003; Dowling et al., 2005; Azmier, 2005; Shao et al., 2013).

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Previous epidemiological research in GD, which has focused largely on Anglo-Saxon countries such as the United States, Canada, and Australia, has found a higher prevalence of EGM use amongst women, and a higher tendency for addiction among gamblers that play EGM (Fattore et al., 2014). Unfortunately, research on this topic in other cultures is more limited. Granero et al. (2009) found a higher prevalence of EGM use amongst males (97%) compared to females (80%) (Granero et al. 2009). Additionally, Tavares and colleagues found that among Brazilian gamblers, EGM was more often used by women, who also tended to have a more rapid progression from recreational gambling to GD, and lower prevalence of alcohol-use disorders (Tavares et al., 2003). Despite its strengths, the work developed by Tavares and colleagues used a relatively small sample ($n=70$) and lacked a cross-cultural analysis. Therefore, their findings were limited to transcultural comparisons, a problem which hinders more reliable and standardized analysis. This limitation results in a gap in understanding how culture influences the use of EGM.

The objective of this paper is to perform a cross-cultural comparison of GD associated with EGM in Brazil and the United States, two countries that have significant differences in socio-cultural background. Our goal is to investigate the socio-demographics, gambling behavior, and psychiatric antecedents of treatment-seeking samples of adults from these two nations. Our hypothesis is that there are significant differences in GD due to EGM between these countries, and that this comparison can lead to a better understanding of cultural influences of GD due to EGM. These investigations could potentially help to improve preventive and therapeutic approaches based on cross-cultural differences in gambling behavior.

2. Methods

2.1. Participants

The present sample included 733 subjects: 353 men and 380 women (average age=45.80, standard deviation ± 10.9). The Brazilian sample was comprised of 517 individuals and the American sample 216.

The Brazilian sample consisted of subjects that voluntarily sought treatment and/or participated in clinical trials at the Impulse Control Disorder Outpatient Unit of University of São Paulo Hospital. The recruitment took place in the outpatient clinics during the standard intake interview. Additionally, media advertisements (internet, radio, Gamblers Anonymous) were used to invite subjects to participate in clinical treatment and clinical trials. The American sample included individuals who were treated at an outpatient gambling clinic and/or participated in clinical trials that were conducted at the University of Minnesota and University of Chicago. Media advertisements (newspapers, internet, public places) were also used to recruit participants. Recruitment took place between 1996 and 2014 in Brazil and between 1998 and 2014 in the United States.

The current study is a sub-analysis of a larger cross-cultural study that compares gamblers from Brazil and the United States (see Medeiros et al., 2015). The total sample consisted of 1446 adult gamblers. Out of this number, 1019 (70.5%) subjects considered EGM a preferred form of gambling, and 733 (50.7%) selected EGM exclusively as their main form of gambling.

Inclusion criteria for the current study were: (1) formal GD diagnosis according to the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5); (2) minimum age of 18 years; (3) outpatient status; (4) selection of EGM as the exclusive main form of gambling. Exclusion criteria included: unstable medical illness or participants who needed emergency care,

clinically significant abnormalities on physical examination, individuals who had less than 5 years of formal education, patients that presented with psychotic symptoms, and subjects that refused to participate in the study.

2.2. Measures

2.2.1. GD diagnosis

The Structured Clinical Interview for Pathological Gambling was used to diagnose GD. This instrument was originally validated using the criteria of the Fourth Edition of the Diagnostic and Statistical Manual of Mental Disorders [DSM-4] (Grant et al., 2004). Trained psychiatrists made all diagnoses.

As the data obtained before the release of DSM-5 were saved electronically, we retrospectively processed them for a proper adaptation to DSM-5 GD criteria. This procedure consisted of deleting the criterion “committed illegal acts such as forgery, fraud, theft, or embezzlement to finance gambling regarding illegal acts”, which was present in previous manual, DSM-4. Additionally, we lowered the diagnostic threshold from five to four, consistent with DSM-5. Remaining criteria were unchanged.

2.2.2. Selection of patients presenting with GD specifically due to EGM

We used an open question assessing the subject's preferred gambling activity. Patients were asked to list the main forms of gambling based on frequency, the amount of money spent and the impact of negative consequences. We selected the patients that selected EGM (which includes slot machines, Keno and all different kinds of video-bingo) as their exclusive main form of gambling.

2.2.3. Socio-demographic data

The two samples were evaluated on several socio-demographic variables, including gender, age, race, marital status, and educational level.

2.2.4. Gambling behavior

All participants were assessed for variables related to course of GD, including age of onset of gambling activity, age of onset of GD, lag onset of gambling activity and onset of GD. GD severity was measured by the total number of DSM-5 criteria endorsed, which, according to American Psychiatric Association, is related to different levels of severity (American Psychiatric Association, 2013).

2.2.5. Psychiatric antecedents

Participants underwent a psychiatric interview using a semi-structured interview that assesses lifetime psychiatric disorders (the Mini International Neuropsychiatric Interview [M.I.N.I.] [Le-crubier et al., 1997]). This instrument is usually performed by professionals after a brief clinical training. It was previously adapted to Brazilian Portuguese (Amorim, 2000).

2.3. Statistical analysis

Initially, we conducted a univariate comparison between the Brazilian and the American samples. The analysis included socio-demographic data, gambling behavior variables, and psychiatric antecedents. Chi-square tests were used for categorical variables. ANOVA and Mann-Whitney's U were used, respectively, for continuous variables with normal and non-parametric distribution. Analyses of clinical variables were controlled for demographic differences between the samples, including, gender, age, marital status, and educational level. This methodology was used to reduce the possible confounding effect of demographics.

Next, we conducted a binary logistic regression in which we

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