Exploring the Predictive Value of Gambling Motives, Cognitive Distortions, and Materialism on Problem Gambling Severity in Adolescents and Young Adults

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Abstract

Gambling motives and cognitive distortions are thought to be associated because both coping and financial motives to gamble appear to be predictors of gambling related cognitive distortions. Therefore, there is an argument to be made that gambling motives, cognitive distortions, and materialism share common attributes and might be related to problem gambling severity. The present paper aims to examine the relationship between these three variables, both in a clinical and community setting, to see if they can predict gambling severity. A sample of 250 participants from the general population and 31 participants from the clinical population was recruited. The results showed that the clinical sample scored higher on gambling severity, cognitive distortions, materialism, and gambling motives. It also showed that low scores in enhancement motives and higher scores in social motives and gambling related cognitions predicted gambling severity in older gamblers, whereas for younger patients, gambling severity was best predicted by higher scores in materialism and coping motives, and lower scores for enhancement and social motives. In the community sample, gambling severity correlated with gambling related cognitive distortions and with gambling motives (except for social and coping motives within the women subsample). These results testify to the importance of materialism, cognitive distortions, and gambling motives as risk factors for problem gambling both in community and clinical samples.

Keywords

Gambling disorder, gambling motives, materialism, cognitive distortions, coping

Introduction

Gambling has become a major economic activity, and due to this fact, many countries have witnessed a surge of gambling related problems (Ferrara et al. 2019). The rise of dysfunctional gambling has been accompanied by a re-categorization of gambling as a behavioural addiction in the DSM-5 (American Psychiatric Association 2013). Younger generations are more attracted to newer forms of gambling such as online sports betting and poker, and as a result, some jurisdictions have been observing an earlier onset of problem gambling (Hing et al. 2017; Shead, Hodgins and Scharf 2008). The age of onset is significant because gambling severity is highly correlated to gambling initiation during adolescence (Jiménez-Murcia et al. 2010). In fact, some studies have suggested that the age of onset mediates the relationship between gender, personality traits, gambling disorder severity, and depression (Jiménez-Murcia et al. 2016).

Some of the most common gambler profiles today include young adults aged 15 to 35, many of them students or graduates from higher education institutions, that progressively spend more time gambling at the expense of other everyday activities (Williams, Connolly, Wood and Nowatzki 2006). A growing body of literature suggests that the gap between the prevalence of adolescent and adult problem gambling is closing (Calado, Alexandre and Griffiths 2017; Huang and Boyer 2007; Volberg et al. 2010). However, multiple factors associated with adolescence still make this group more vulnerable to the harms of gambling (Abbott et al. 2018; Richmond-Rakerd et al. 2014). First, adolescence is a transition period characterised by risk-seeking behaviour, which tends to ameliorate as adolescents grow older and adopt adult roles in society (e.g., obtaining a full-time job or parenting) (Filipa Calado, Alexandre and Griffiths 2017; Hardoon, Gupta and Derevensky 2004; Kelley, Schochet and Landry 2004). Second, contemporary young generations are arguably the first in modern history to grow in an environment in which gambling is widely accepted, accessible, and promoted. As a consequence, these social factors facilitate gambling behaviour among young adults while increasing the inherent risks associated with it (Volberg et al. 2010).

Similarly, most studies show that problem gambling is more prevalent among males than females (Jiménez-Murcia et al. 2020; Valero-Solís et al. 2018). Some other gender differences include an earlier onset, a longer evolution, and a bigger inclination for skill-based games in men (Baggio et al. 2018), although, according to these authors, women's gambling preferences are changing and prevalence of problematic gambling in women is on the rise.

Motives to start gambling vary greatly and range from winning money, escapism, hedonic reasons, to social facilitation by peer pressure (Francis et al. 2015; Neighbors et al. 2002). One of the most cited models for gambling motives was proposed by Stewart and Zack (2008). This model posits three categories: enhancement (i.e., to increase

positive emotions), social (i.e., to increase social affiliation), and coping motives (i.e., to reduce negative emotions). Higher scores in coping and enhancement related to gambling motives have been found to positively correlate with gambling severity, whereas social motives are negatively correlated (MacLaren et al. 2012). There is evidence that indicates that the social context in which young adults are brought up is relevant to their motivation to gamble (Bristow et al. 2018). In particular, adolescents who gamble to alleviate negative emotions (i.e., coping strategy) are more likely to engage in solitary gambling. Also, those who gamble for enhancement motives tend to be surrounded by unknown gamblers whereas social gamblers are typically accompanied by friends and/or family members (Quinlan et al. 2014). In addition, there seems to be a relationship between the typology of gamblers defined in Blaszczynski and Nower's pathways model (2002) and gambling motives (enhancement, coping, and social) (Quinlan et al. 2014).

Obtaining financial rewards is an obvious motivation for engaging in gambling activities. Some research suggests that financial motives are stronger among low and moderate risk gamblers than among problem gamblers (Schellenberg et al. 2016), which calls for further research on the role of motives. Others have observed in a sample of young adults that financial motives are a predictor of problematic gambling (Temitope, Oyekola and Mary 2019). More precisely, the results suggest that the lack of financial support and financial strain could motivate the youth to start gambling (Temitope et al. 2019). These findings have been corroborated in alternative studies that have also observed that money generation is one of the key motivations for young gamblers (Goldstein et al. 2016).

The importance of financial motivations has shifted the focus towards materialism as an explanatory variable. Materialism consists of exaggerating the value of acquiring and possessing objects, and interpreting such objects as extremely important to understand one’s life and identity. Moreover, materialistic people are more likely to assess their own and others’ success in relation to the quantity and quality of their belongings (Guerrero-Vaca et al. 2019; Mueller et al. 2011). Along these lines, some authors have pointed out that gambling could be associated with the necessity of acquisition and possession of goods (Gentina et al. 2018). In this regard, problem gamblers appear to be more materialistic than non-problem gamblers, although obtaining valuable items was not an end in itself but a means to obtain something else (Eyzop et al. 2019; Wu, Lai and Tong 2015). One interpretation could be that problem gamblers see material goods as a reflection of their personal achievements, which in turn compensate for low self-esteem (Ruiz-Olivares et al. 2010). Similar conclusions had been reached by Chang and Zhang (2008), who identified high materialism as a determinant to engage in risky gambling. On a more sociological level, the beliefs that material belongings are essential to one’s happiness seem to interact in leading people to continue gambling, contributing to the development and maintenance of excessive gambling (Eyzop et al. 2019).

Young adult gamblers who score high on materialism also seem to be more vulnerable to gambling advertising and promotions (Goldberg et al. 2003). Considering the results of a study in which highly materialistic university students also scored high on self-enhancement, it could be argued that materialism could be linked to enhancing positive emotions, despite the fact that material values are similarly associated with reduced wellbeing (Karabati and Cemalcilar 2010).

Other determinants of problem gambling are cognitive distortions, including illusion of control, gambler's fallacy, which are associated with the erroneous beliefs that gambling outcomes can be predicted, even in chance-based games such as slot machines (Yakovenko et al. 2016). Cognitive distortions appear to increase as gambling severity increases (Ledgerwood et al. 2019; Mallorquí-Bagué et al. 2019; Schluter et al. 2019). An early age of onset is problematic because winning large prizes in the first gambling occasions can have a lasting impact on young gamblers, facilitating the appearance of irrational beliefs and a greater perception of self-efficacy and control (Monaghan et al. 2009). Research has shown that while cognitive distortions in non-problem gamblers are bigger among adults than adolescents, the opposite is true in problem gamblers —i.e., young problem gamblers have on average more cognitive distortions than adult problem gamblers (Tang and Wu 2012).

Gambling motives and cognitive distortions are thought to be associated because coping and financial motives are predictors of distortions (Mathieu et al. 2018). Thus, there is an argument to be made that gambling motives, cognitive distortions, and materialism share common attributes and are related to problem gambling severity. Nevertheless, few studies have looked at these variables in the context of young adult gamblers as a way of determining their long-term gambling severity. Additionally, the vast majority of studies about gambling motives have relied on community samples, with few focusing on the differences between general population and clinical samples (Jauregui et al. 2018). Therefore, the current paper aims to examine the relationship between gambling disorder severity, gambling motives, cognitive distortions, and materialism both in a clinical and a community setting. Secondly, the paper also seeks to determine whether sex, age, materialism, gambling motives, and cognitive distortions can predict gambling severity in both samples.

Methods

Characteristics of the sample

A sample of 250 participants from the community and 31 participants from the clinical population were recruited for the study. Table 1 includes the description for the two samples of the study regarding sociodemographic

and clinical variables. The community sample was recruited from public and private secondary education institutions from the Basque Country region in Spain following a convenience sampling, whereas the clinical sample comprised treatment-seeking outpatient individuals recruited from a hospital setting.

Measures

Materialism. Materialism Values Scale (MVS; Richins and Dawson 1992). In this study, the Spanish adaptation by Lado and Villanueva (1998) was utilized. This scale has 18 items, which assess materialistic values, with an overall score and three subscales, which measure importance, success, and happiness based on materialism, following the conceptualization put forward by Richins and Dawson (1992). Items use a four-point Likert scale ranging from 0 (= *completely disagree*) to 3 (= *completely agree*). The Spanish scale has an adequate internal consistency, with a Cronbach's alpha coefficient of .89 for the overall scale, and coefficients of .77 and .83 for the subscales. A confirmatory factor analysis has confirmed a 3 factor-structure (CFI= .91, GFI= .90, TLI= .89, RMSEA= .049).

Gambling motives. Gambling Motives Questionnaire (GMQ; Stewart and Zack 2008). Spanish adaptation by Jauregui et al. (2018). This questionnaire assesses the frequency of gambling for 15 reasons that make up three subscales of five items: Enhancement (referring to internal positive reinforcement such as to increase positive emotions; e.g., 'To get a "high" feeling'), Coping (which alludes to internal negative reinforcement; that is, to reduce or avoid negative emotions; e.g., 'Because it helps you when you are feeling nervous or depressed'), and social motives (or external positive reinforcement motives such as increasing social affiliation; e.g., 'Because it's what most of your friends do when you get together'). Each of the items is an adaptation from the Drinking Motive Questionnaire (Cooper 1994) and is rated on a 4-point Likert scale ranging from 1 (*almost never/never*) to 4 (*almost always*). All subscales showed good internal consistency ($\alpha > .80$), whereas in this study, alphas where between .71 and .85. Moreover, concurrent validity analyses revealed that Enhancement consistently predicted greater gambling behavior, whereas, when taken conjointly with Coping, they consistently predicted more severe gambling problems.

Gambling Disorder. Canadian Adolescent Gambling Inventory – CAGI (Tremblay et al. 2010). Adapted to Spanish by Jiménez-Murcia et al. (2017). It is a self-report instrument that measures adverse psychosocial consequences of gambling in adolescent populations. It comprises two sections. First, it includes 20 items (using a 6-point Likert) to analyse gambling frequency, time spent gambling, gambling mode, and money or other valuable objects lost gambling. Second, it includes 24 items (on a 4-point Likert) to measure (i) problem gambling severity, (ii) psychological consequences, (iii) social consequences, (iv) financial consequences, and (v) loss of control. The CAGI also includes a general problem severity subscale (GPSS), which consists of nine items distributed through the four CAGI subscales.

The scale shows excellent psychometric properties, with internal consistency values ranging from .83 to .90 in the original scale and .91 in the Spanish adaptation. Similarly, it has great convergent validity with the South Oaks Gambling Screen (SOGS) (*r = .33* in community samples and *r = .74* for clinical samples).

Cognitive distortions about gambling. Gambling Related Cognitions Scale (GRCS; Raylu and Oei 2004). Adapted to Spanish by Del Prete et al. (2017). This instrument gauges gambling related cognitions through 23 items measured on a 7-point scale and structured in five domains: (i) interpretive bias, (ii) predictive control, (iii) gambling related expectancies, (iv) illusion of control, and (v) perceived inability to stop gambling. The first domain, "interpretative bias", measures reframing gambling outcomes that could encourage gambling activities despite losses, with items covering: a) attribution of success to the one's skill and ability and failures to external influences; b) expecting that persistence in gambling will allow winning which it was lost previously; and c) expecting luck or recalling wins more easily than losses. The domain "predictive control" includes a set of items measuring: a) the self-perceived capacity to make accurate predictions regarding gambling, based on past wins/losses and on salient cues; and b) probability errors related with the nature of chance (believing that continued gambling might contribute to recoup losses, or assigning causal influences to factors associated to wins). The domain "gambling related expectancies" measures the cognitions related to the individuals' expectations about gambling activity, with items measuring that gambling is used to receive approval or social acceptance from others, to demonstrate one's worth/capacity, to relieve negative/painful emotions, to beat the odds, to experience excitement, to have fun or to reduce boredom. The domain "illusion of control" includes items measuring the belief that the individuals could control gambling outcomes based on their personal skill, ability or knowledge; this self-perceived capacity includes active illusionary control (such as belief that relying in lucky numbers or superstitious/ritual behaviours could influence gambling outcomes) and passive illusionary control (beliefs regarding control over luck). The fifth domain, "perceived inability to stop gambling" includes items to measure: a) intolerable feelings of disappointment/distress in the absence of gambling activity; and b) sense of helplessness to control the gambling behaviours. Psychometric properties are adequate, with a Cronbach's alpha of .93 for the overall scale and between .77 and .91 for individual subscales in the English original, and .94 for the overall scale and between .72 and .80 for the Spanish adaptation. Confirmatory Factor Analysis has attested to its 5-dimensional factorial solution. Concurrent validity in all subscales has been demonstrated due to its positive correlation with the SOGS and the MULTICAGE CAD-4 (Pedrero Pérez et al. 2007).

Procedure

Recruitment of participants comprised two separate procedures. In the case of the community sample, several invitations were sent out to institutions, and in those which accepted the invitation to participate, a research team member travelled to administer the paper-and-pencil questionnaires in person. Students completed the survey in their classroom individually. The survey included general information regarding the study purposes. Adult participants signed an agreement to participate in the study. Minors were requested signed consent from their parents/tutors prior to the study. In the case of the clinical sample, all participants meet a diagnosis of gambling disorder at the Behavioral Addictions Unit within the Department of Psychiatry, at a University Hospital from Spain. Patients were derived through general practitioners or via other healthcare professionals. Experienced psychologists and psychiatrists conducted two face-to-face clinical interviews. Additional sociodemographic and clinical information was taken, and patients individually completed all the instruments utilized in this study, before initiating outpatient treatment. Exclusion criteria were: the presence of intellectual disability, an organic mental disorder, a neurodegenerative condition, or an active psychotic disorder.

All participants were reassured of their rights to confidentiality, anonymity, and withdrawal. Furthermore, details to contact the research team were handed. The research had obtained the ethics committee approval from the first author's university.

Statistical analyses

Stata15 for Windows (StataCorp 2017) was used for the statistical analysis. Firstly, the comparison concerning the sociodemographic and clinical profiles between the two subsamples (community versus clinical groups) was based on chi-square tests (χ^2) for categorical variables and on T-TEST procedures for quantitative variables.

Next, the association between the gambling severity (measured as the CAGI total score) and the materialism measures, the motive for gambling dimensions and the gambling related cognitions scales was calculated with partial correlation coefficients (R). Due to the potential moderator effect of the origin of the sample (i.e., community/clinical) and participants' sex and age, stratified estimates were obtained into each subsample (community/clinical), group of sex (women/men) and group of age (two groups were defined based on the median [percentile 50], labelled in the study as younger/older). In addition, and based on the strong association between correlational statistical significance and sample sizes (non-significant results can be usually found in small-sized samples even for high *R*-coefficients, while poor *R*-coefficients could achieve significance in large sample sizes), low-poor effect size was considered for $|R|>0.10$, moderate-medium for $|R|>0.24$ and large-high for $|R|>0.37$ (these thresholds correspond to Cohen's-d of 0.20, 0.50 and 0.80 respectively; Rosnow and Rosenthal 1996).

Predictive models for the gambling severity (CAGI total score) were obtained with Generalised Linear Models (GLM) using the Normal-distribution and the Identity Link Function. These models also tested if the potential contribution of the materialism, motive for gambling and cognitive bias related to the gambling activity on the gambling severity level were different according to the participants' sex and age (that is, the potential moderator effect of gender and age). The independent variables of these analyses were the participants' sex and age, materialism (total score), motive for gambling (MGQ scale scores), and gambling related cognitions (GRCS total score). The total scores for materialism and cognitions were selected for the GLM due to the large set of variables. Separate models for each subsample (community/clinical) were adjusted. The model for the community sample was defined in two steps: a) the first step entered/fixed the independent variables (sex, age, materialism, motive for gambling, and gambling cognitions), and added/tested the interaction parameters defined between the participants' sex and age with the other measures; and b) after valuing the set of interaction parameters, a final model was obtained retaining only those significant interaction terms ($p \leq .05$). For the final model, main effects were estimated and interpreted for non-significant interaction parameters and single effects for significant interaction parameters. Within the clinical sample, and due the low sample size, this same general process was used, but through three separate initial models (one for each questionnaire: materialism, MGQ and GRCS), because the low sample size do not allow entering simultaneously all the predictors. Each initial model was performed in the two steps: a) entering and fixing the participants' sex and age, with the questionnaire scale/s, and adding/testing the interaction parameters; b) defining a final model retaining only significant interaction terms, with main or single effects depending on the significance level of the moderation effect/s.

In this work, the Holm's procedure was also used to control increases in the Type-I error due to multiple statistical comparisons (Holm's method is included in the Familywise error rate stepwise techniques and it has demonstrated more statistical power than the classical Bonferroni correction; Holm 1979). In addition, analyses stratified by the subsamples (community/clinical) were obtained for testing potential differences in the relationship patterns due to the heterogeneity of the samples' origin and to allow external generalisation for the populations (community and clinical settings).

Results

Characteristics of the sample and comparison between groups

Table 1 contains the descriptives for all the variables of the study (sociodemographic and clinical profiles), as well as the comparison between the subsamples (community versus clinical). Groups differed in sex (higher proportion of men in the clinical group), education (higher proportion of patients at the lower levels in the clinical group), age

(older mean age in the clinical group), gambling severity (worse level in the clinical), and all the scales measuring gambling related cognitions, motives for gambling, and materialism (except for relevance and happiness scales).

--- Insert Table 1 ---

Correlation analysis

Table 2 contains the partial correlation estimates measuring the association between gambling severity (CAGI total) with materialism, motive for gambling, and gambling related cognitions scores. In the community sample, materialism scores did not achieve relevant correlations with gambling severity. However, all the motives for gambling scales and the gambling related cognition scales positively correlated with gambling severity, except for the motive-social, motive-coping and cognitions-inability to stop scales (these measures did not correlate with the gambling level in the women's group).

--- Insert Table 2 ---

In the clinical subsample, the correlation pattern was different depending on the stratum: a) in the men's group, high scores in materialism-happiness, materialism-total and gambling related cognitions correlated with higher gambling level; b) in the younger group (patients 20 years-old or younger), higher materialism-relevance scores, lower motive-enhancement, lower motive-social, and higher gambling related cognitions (except for expectancies and predictive control) were related to higher gambling severity; and c) in the older group (patients with age equal or older than 21 years-old), higher materialism scores (except for the relevance dimension), higher motive-social, and higher gambling related cognitions were related to higher gambling severity.

Predictive analysis

Table 3 contains the results of the final GLM measuring the predictive contribution of participants' sex, age, materialism, motives for gambling, and gambling related cognitions (defined as independent variables) on gambling severity (defined as the dependent variable). Table S1 (supplementary material) includes the results for the GLM in the first step (testing the complete set of interactions).

--- Insert Table 3 ---

For the community subsample, only one interaction parameter was retained into the final model (age by motive-social score). The results of the final GLM showed that higher gambling severity was obtained for men, participants with older ages, lower scores in materialism total, higher scores in motive for gambling enhancement and coping and higher score in gambling related cognitions. Motive for gambling social score was only predictive of greater gambling severity only for younger participants.

Concerning the clinical sample, being male and younger age were significant predictors of higher gambling severity. In addition, the Model 1 (obtained for the predictor materialism score) showed that higher scores in the materialism scale were related to the higher gambling severity, and that the relationship is stronger within the patients' in the older age group. The Model 2 obtained for the scores in the MGQ questionnaire showed that lower levels in enhancement are related to higher gambling severity. For motive for gambling social and coping scales, the interaction with age was retained in the model, and single effects showed that: a) within the younger age group, lower scores in social and higher scores in coping predicted higher gambling severity; and b) within the older age group, higher scores in social are related to the higher gambling severity level. Finally, the Model 3 obtained for the gambling related cognitions showed that higher cognitive biases are related to higher gambling severity, being the relationship stronger for the patients within the older age group. It must be outlined, however, that results obtained in GLM within the clinical sample must be interpreted with caution due to the small sample size.

Discussion

The present study aimed to examine the relationship between gambling severity, materialism, gambling motives, and gambling related cognitive distortions in two samples of clinical and community participants. Firstly, both samples were compared for these variables. The results showed that the clinical sample scored higher on gambling severity, cognitive distortions, materialism, and gambling motives, which aligns well with existing empirical evidence (Orgaz et al. 2013; Sivagnanam et al. 2018; Sundqvist et al. 2016; Tabri et al. 2017). In the community sample, gambling severity correlated with gambling motives and cognitive distortions. Such distortions have been previously found both in problem and non-problem gamblers, especially in the case of skill-based gambling forms such as poker, which highlights the importance of cognitions in all levels of gambling harm (Wu, Sescousse, Yu, Clark, and Li 2018). Results on gambling motives reflected those studies previously conducted on community samples of adolescents and young adults (Lambe et al. 2015). Furthermore, some gender differences have been identified in the samples: while in men, gambling severity correlated with all types of gambling motives, in women only enhancement motives exhibited statistical significance. This could be due to the age disparity in the sample, because older women consistently report escapism as their main gambling motive (Flack and Stevens 2019). However, studies with community samples have reported enhancement motives to be essential for young adults, which could probably mean young women feature a distinct gambler profile (Granero et al. 2018; Lambe et al. 2015).

Per contra, the clinical sample showed high correlations between gambling severity, materialism, and cognitive distortions. Regarding materialistic ideas, many gamblers seeking for help in treatment centres manifest great preoccupation about money, partly due to their belief that money could make their debt problems go away and, with

these, their gambling problems. This is indeed an irrational belief because debt settlement *per se* is unlikely to stop the gambling behaviour (Rugle 2004). In the most conservative interpretation of these results, gambling related distortions could potentially be responsible for fostering the evolution of pathological gambling considering their relevance in both samples. Taken as a whole, these results emphasise the importance of paying attention to cognitive distortions as a means to prevent gambling problems. This is even more so considering the evidence suggesting that cognitive distortions are one of the biggest predictors of future gambling involvement (Yakovenko et al. 2016). In fact, the relationship between psychological vulnerability and problem gambling has been argued to be mediated by cognitive distortions (Lévesque et al. 2018).

Furthermore, age-based differences were found in the clinical setting. In the older group, happiness and success factors of materialism correlated with gambling severity, while relevance factor was correlated in the young people's group. Nevertheless, materialism was related to gambling severity in all age groups. Along these lines, recent empirical data indicate that as people grow older, materialistic dimensions get modified as a result of the influence of a construct named self-uncertainty (Martin et al. 2019). Self-uncertainty has to do with an individual's construction of the self by means of competence, self-concept, and self-esteem (Martin et al. 2019). Sometimes, as individuals get older, life events deteriorate the perception of the self, and in such cases resorting to material goods might function as a way to avoid and/or cope with the negative emotions associated with it (Reeves et al. 2012). Self-uncertainty can be reduced by acquiring objects and achievements, thus avoiding more internal mechanisms of self-construction (Martin et al. 2019). According to previous research, gambling behaviour is more prevalent among people who consider money as a tool to achieve prestige and power, as well as among people who feel anxious about money and persist in gambling to obtain greater financial security (Lostutter et al. 2019). The implication is, therefore, that attitudes toward money can condition gambling attitudes.

With respect to gambling motives in the clinical sample, social motives were more common amongst the older group whereas the younger group had stronger correlations with enhancement and social motives. These results differ from those from the community sample, in which gambling severity was associated with gambling severity in all age groups. One interpretation could be that gambling motives are not stagnant, meaning that gamblers change their motives to gamble as they become more engaged with gambling, probably as a result of a change in outcome expectancies, something that might not necessarily be true for those with less gambling involvement (McGrath and Konkolÿ Thege 2018; Shead et al. 2008).

In the present investigation, age did not explain differences in cognitive distortions, which contradicts previous findings from Tang and Wu (2012). It could be the case that in the current samples, age was also determined by gambler profile and gambling type. Official gambling data from the Spanish Gambling Commission (Directorate General for the

Regulation of Gambling [DGOJ] 2017) reports that young gamblers prefer sports betting (30-40% of them) and internet gambling in general (56.3%) rather than slot machines, which are preferred by 79% of the older group. Illusion of control is believed to be higher among skill-based rather than chance-based gamblers (Myrseth et al. 2010). Also, the size of the clinical sample could be affecting the outcomes on this matter.

It was tested how age, gender, materialism, gambling motives, and gambling related cognitions could work as predictors of gambling severity. In the community sample, being male, older age, lower overall scores in the materialism, higher scores in enhancement and coping motives, and higher scores in gambling related cognitions were able to predict gambling severity. In the clinical sample, being male, younger age, low scores in enhancement motives, higher cognitive bias related to the gambling activity and higher score in the motive coping scale were related to higher severity level. In the clinical sample, in addition, the interaction between age showed that lower scores in the motive for gambling social scale and higher score in the motive for gambling coping scale predicted more severe GD within the younger age group, while higher score in the motive for gambling social score was predictive of higher GD severity within the older age group. To the best of our knowledge, these results are original. Although all of these independent variables have shown relevance concerning gambling disorder, there is a paucity of research demonstrating that they might also anticipate the onset of gambling problems in young gamblers. Research carried out with undergraduate students found that male gender, higher frequency of play, and cognitive distortions were predictive of internet gambling, and cognitive distortions stood out as the most significant predictors in comparison with demographic variables and level of gambling involvement (MacKay and Hodgins 2012). Likewise, gambling motives have been found to be predictive of gambling disorder in young adults and adolescents, especially in the case of enhancement motives (Lambe et al. 2015), whereas adults seem to be vulnerable to a wider array of motives (including financial) (Schellenberg et al. 2016). The current study showed these trends in a combined sample of clinical and community-level population, which departs from previous studies that have primarily drawn conclusions from data produced by participants recruited from the general population (Mathieu et al. 2018).

Finally, both samples showed that being men was predictive of gambling severity, although this relationship was moderated by age. In particular, in the community sample, being older predicted more severe gambling consequences, whereas the opposite happened in the clinical sample, wherein a younger age was a predictor of gambling severity. In fact, age significantly interacted with most variables in this study, which highlights its relevance to understand gambling disorder. It might be possible that the current clinical sample could be skewed towards individuals who have engaged in gambling very early in life and developed gambling related harm very rapidly (see Jiménez-Murcia et al. 2010), which seems to be in line with the evidence suggesting that as individuals grow older, their relative risk to develop gambling disorder decreases (Edgerton et al. 2014).

A series of limitations must be acknowledged in this study. First, the cross-sectional design of the study does not allow for testing causal relationships. Further investigations using a longitudinal setup will be able to control for the interaction of the studied variables over time. Similarly, gambling types were not taken into account in the models. Such differences might have had an impact on the results and future studies should look into it. Regarding sample size, the clinical sample was relatively small, what makes the authors wonder if a larger sample, including a larger female representation from the clinical setting, could render different results. Furthermore, not only the magnitude of the samples but their dissimilarity in size can be considered a limitation. Although using fewer participants from the community could have been an alternative choice (for example paired by age and sex), it was considered preferable to use the maximum number of participants from each group to contribute to the improvement of the external validity of the research (selecting subjects in order to have equivalent samples sizes could have yielded an unnecessary selection bias) (Maas and Hox 2005). As for the community sample, two limitations must be acknowledged. First, gambling intensity was not measured, which means potentially different gambling profiles have been grouped together. Second, gambling severity in this sample was self-reported as opposed to the clinical sample where self-report instruments were accompanied by face-to-face interviews run by professional clinicians. Finally, this study analyzed the predictive contribution of the individuals' sex and age, the materialism measure, motive for gambling activity and gambling related cognitions on the gambling severity levels. However, other risk factors of the gambling intensity have not been considered in the study, such as the socioeconomic status (SES). Since it is expected a relationship between SES with the other variables of the study (mainly with materialism), future research should assess the potential moderator (or mediational) of this variable in the underlying the mechanisms explaining the gambling severity level in both community and clinical settings.

These results show the significance of materialism, cognitive distortions, and gambling motives as risk factors for problem gambling both in community and clinical samples. Nonetheless, this paper provides a more nuanced picture of the interaction of these variables, particularly regarding the role of age and clinical/community settings. One of the determinants for gambling disorder that stood out in this study was cognitive distortions, which have been signaled as a key component in treating problem gambling (Fortune and Goodie 2012). Authors such as Donati et al. (2018) put forward a prevention program for adolescents based on the theoretical underpinnings that cognitive distortions are essential to address gambling problems in early stages.

Funding Financial support was received through the Ministerio de Ciencia, Innovación y Universidades (grant RTI2018-101837-B-100). FIS PI14/00290, FIS PI17/01167 received aid from the Ministerio de Sanidad, Servicios Sociales e Igualdad. The research was also funded by the Delegación del Gobierno para el Plan Nacional

sobre Drogas (2017I067 and 2019I47), CIBER Fisiología Obesidad y Nutrición (CIBERobn) and CIBER Salud Mental (CIBERSAM), both of which are initiatives of ISCIII. We thank CERCA Programme/Generalitat de Catalunya for institutional support. Fondo Europeo de Desarrollo Regional (FEDER) "Una manera de hacer Europa"/"a way to build Europe". HLG is funded by the Beatriu de Pinós programme of the Secretariat for Universities and Research (Grant Number 2017 BP00035). GMB is supported by a postdoctoral grant of the Fundación Ciudadanía y Valores. TMM, MLM and CVA are supported by a predoctoral grant awarded by the Ministerio de Educación, Cultura y Deporte (FPU16/02087; FPU15/0291; FPU16/01453).

Compliance with Ethical Standards Conflicts of interest The authors declare that they have no conflict of interest. Ethics Approval Participation in this study had no compensation whatsoever for the people who participated. All schools received a general feedback report. This study was carried out in accordance with the latest version of the Declaration of Helsinki. The Ethics Committee of the first author's university approved the study (ref number ETK-13/15-16).

Consent to Participate Signed informed consent was obtained from all participants.

Consent for Publication Consent for publication of this article has been obtained from all authors.

Availability of Data and Material Due to the nature of this research and the clinical composition of one of the samples, participants of this study did not agree for their data to be shared publicly, therefore, supporting data is not available.

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Table 1 Descriptive for the variables of the study and comparison between groups

			Community sample				
			Community		Clinical		
			n=250		*n=31*		
			n	*%*	*N*	*%*	*p*
Sex	*Female*		124	49.6%	3	9.7%	**<.001***
	Male		126	50.4%	28	90.3%	
Education level	*Primary*		0	0.0%	6	19.4%	**<.001***
	ESO or FP-mean		115	46.0%	11	35.5%	
	Bachelor or FP-high		135	54.0%	14	45.2%	
Origin	*Spain*		224	89.6%	27	87.1%	.670
	Immigrant		26	10.4%	4	12.9%	
			Mean	SD	Mean	SD	*p*
Age (years-old)			18.21	4.88	20.81	2.39	**.004***
Gambling severity: CAGI total		.964	1.12	2.70	10.68	7.47	**<.001***
Materialism measures							
Factor relevance		.757	8.82	2.77	8.94	2.76	.827
Factor happiness		.701	10.33	3.42	10.97	3.20	.326
Factor success		.815	11.97	4.45	14.23	3.84	**.007***
Total score		.801	31.10	7.79	34.13	8.32	**.004***
Motives for gambling (MGQ)							
Factor enhancement		.863	7.20	3.13	11.35	4.16	**<.001***
Factor social		.747	6.33	2.00	8.06	2.77	**<.001***
Factor coping		.923	5.44	1.43	10.55	4.39	**<.001***
Gambling cognitions (GRCS)							
Gambling expectancies		.820	5.63	3.41	11.19	5.84	**<.001***
Illusion of control		.798	5.44	2.89	6.55	3.02	**.045***
Predictive control		.884	9.10	5.78	13.71	8.38	**<.001***
Inability to stop gambling		.849	6.44	3.78	15.74	7.91	**<.001***
Interpretive bias		.830	5.87	3.65	10.55	5.92	**<.001***
Total score		.954	32.44	17.64	57.55	25.70	**<.001***

Note. SD: standard deviation. α: Cronbach's alpha in the sample. *Bold: statistical difference (.05 level).

Table 2 Association of the gambling disorder severity (CAGI total score) with materialism, motives for gambling and gambling related cognitions measures: partial correlations

	Community sample				Clinical sample		
	Sex		[1]Groups of age		Sex	[2]Groups of age	
	[3]Women	[3]Men	[4]Younger	[4]Older	[3]Men	[4]Younger	[4]Older
	n=124	n=126	n=135	n=115	n=28	n=15	n=16
Materialism measures							
Factor relevance	.089	.037	.081	.010	.213	**.263**[†]	.111
Factor happiness	.055	.028	-.003	.048	**.341**[†]	.047	**.442**[†]
Factor success	.024	.114	.159	.032	.231	.091	**.315**[†]
Total score	.069	.092	.121	.043	**.308**[†]	.160	**.367**[†]
Motive for gambling (MGQ)							
Enhancement	**.246**[†]	**.413**[†]	**.249**[†]	**.448**[†]	-.088	**-.322**[†]	.004
Social	.194	**.385**[†]	**.282**[†]	**.335**[†]	.030	**-.509**[†]	**.424**[†]
Coping	.223	**.484**[†]	**.404**[†]	**.438**[†]	-.089	-.170	-.038
Gambling cognitions (GRCS)							
Gambling expectancies	**.396**[†]	**.390**[†]	**.444**[†]	**.337**[†]	**.364**[†]	.196	**.508**[†]
Illusion of control	**.254**[†]	**.342**[†]	**.382**[†]	**.260**[†]	**.336**[†]	**.371**[†]	**.243**[†]
Predictive control	**.365**[†]	**.469**[†]	**.471**[†]	**.430**[†]	**.322**[†]	-.004	**.445**[†]
Inability to stop	-.005	**.330**[†]	**.294**[†]	**.311**[†]	**.652**[†]	**.586**[†]	**.668**[†]
Interpretive bias	**.352**[†]	**.457**[†]	**.493**[†]	**.395**[†]	**.477**[†]	**.254**[†]	**.504**[†]
Total score	**.334**[†]	**.451**[†]	**.479**[†]	**.397**[†]	**.537**[†]	**.345**[†]	**.588**[†]

Note. [1]Groups of age based on the median in the sample: younger (age≤17 years-old) and older (age≥18 years-old).

[2]Groups of age based on the median in the sample: younger (age≤20 years-old) and older (age≥21 years-old).

[3]Partial correlations adjusted by age. [4]Partial correlations adjusted by sex.

[†]Bold: effect size into the medium-mean ($|R|>0.24$) to high-large ($|R|>0.37$) range.

The correlation estimates were not reported for the clinical women group due the low sample size ($n=3$).

Table 3 Predictive models for the criterion gambling severity (CAGI total): final GLM retaining only significant interaction parameters

Community sample (n=250)		*B*	*SE*	*95%CI(B)*		*p*
Sex (0=female; 1=male)		1.195	0.140	0.922	1.469	**<.001***
[1]Group of age (0=younger; 1=older)		1.032	0.456	0.139	1.925	**.024**
Materialism: Total score		-0.027	0.009	-0.045	-0.010	**.002**
Motive for gambling: Enhancement		0.103	0.027	0.050	0.156	**<.001***
[2]Motive for gambling: Social	*Younger age (age≤17)*	0.102	0.048	0.008	0.196	**.033***
	Older age (age≥18)	-0.077	0.062	-0.198	0.044	.213
Motive for gambling: Coping		0.503	0.059	0.388	0.619	**<.001***
Cognitions: Total score		0.045	0.004	0.036	0.053	**<.001***
Interaction: Age by Motive Social		*-0.179*	*0.070*	*-0.317*	*-0.042*	***.011****
Clinical sample (n=31)		*B*	*SE*	*95%CI(B)*		*p*
Model 1. Predictor/s: materialism						
Sex (0=female; 1=male)		12.687	0.713	11.289	14.085	**<.001***
[1]Group of age (0=younger; 1=older)		-8.580	1.676	-11.865	-5.295	**<.001***
[2]Materialism: Total	*Younger age (age≤20)*	0.130	0.034	0.062	0.197	**<.001***
	Older age (age≥21)	0.292	0.031	0.231	0.353	**<.001***
Interaction: Age by Materialism		*0.162*	*0.046*	*0.071*	*0.253*	***<.001****
Model 2. Predictor/s: motive for gambling						
Sex (0=female; 1=male)		19.836	0.789	18.290	21.383	**<.001***
[1]Group of age (0=younger; 1=older)		-24.174	1.503	-27.120	-21.229	**<.001***
Motive for gambling: Enhancement		-0.461	0.065	-0.588	-0.333	**<.001***
[2]Motive for gambling: Social	*Younger age (age≤20)*	-1.083	0.101	-1.282	-0.884	**<.001***
	Older age (age≥21)	1.565	0.121	1.328	1.802	**<.001***
[2]Motive for gambling: Coping	*Younger age (age≤20)*	0.214	0.071	0.075	0.353	**.002***
	Older age (age≥21)	0.038	0.072	-0.103	0.180	.596
Interaction: Age by Motive Social		*2.647*	*0.155*	*2.343*	*2.952*	***<.001****
Interaction: Age by Motive Coping		*-0.176*	*0.090*	*-0.352*	*0.001*	***.049****
Model 3. Predictor/s: motive for gambling						
Sex (0=female; 1=male)		9.509	0.835	7.873	11.145	***<.001****
[1]Group of age (0=younger; 1=older)		-5.011	1.111	-7.188	-2.834	***<.001****
[2]Gambling cognitions: Total	*Younger age (age≤20)*	0.103	0.013	0.079	0.128	***<.001****
	Older age (age≥21)	0.157	0.010	0.136	0.178	***<.001****
Interaction: Age by Gambling Cognitions		*0.054*	*0.016*	*0.021*	*0.086*	*.001**

Note. [1]Groups of age based on the median in the sample.

[2]Single effects for groups of age defined by the median in the sample.

*Bold: significant parameter (.05 level). Italic font: significant interaction parameters retained into the final models.

Table S1 (supplementary material) Predictive capacity of sex, age, materialism, motive for gambling and gambling related cognitions on gambling severity (CAGI total): GLM results for the models testing interaction parameters

Community sample (n=250)	*B*	*SE*	*95%CI(B)*		*p*
First model: testing interaction parameters					
Sex (0=female; 1=male)	-5.832	0.926	-7.647	-4.016	**<.001***
[1]Group of age (0=younger; 1=older)	5.573	0.952	3.708	7.439	**<.001***
Materialism: Total score	-0.001	0.014	-0.028	0.027	.967
Motive for gambling: Enhancement	-0.069	0.060	-0.187	0.049	.249
Motive for gambling: Social	0.074	0.060	-0.044	0.191	.218
Motive for gambling: Coping	0.341	0.140	0.067	0.615	**.015**
Gambling cognitions: Total score	0.042	0.010	0.022	0.062	**<.001***
Interaction: Sex by Materialism	-0.027	0.020	-0.065	0.012	.178
Interaction: Sex by Motive Enhancement	0.177	0.084	0.013	0.341	**.035***
Interaction: Sex by Motive Social	0.131	0.098	-0.061	0.322	.180
Interaction: Sex by Motive Coping	1.078	0.181	0.724	1.432	**<.001***
Interaction: Sex by Gambling Cognitions	0.002	0.012	-0.022	0.027	.843
Interaction: Age by Materialism	-0.026	0.020	-0.066	0.013	.185
Interaction: Age by Motive Enhancement	0.104	0.070	-0.033	0.241	.138
Interaction: Age by Motive Social	-0.211	0.103	-0.413	-0.009	**.041***
Interaction: Age by Motive Coping	0.059	0.120	-0.176	0.294	.623
Interaction: Age by Gambling Cognitions	0.001	0.010	-0.018	0.019	.937
Clinical sample (n=31)	*B*	*SE*	*95%CI(B)*		*p*
Model-1 (materialism): testing interaction parameters					
Sex (0=female; 1=male)	8.732	3.838	1.210	16.253	**.023***
[1]Group of age (0=younger; 1=older)	-8.215	1.712	-11.570	-4.860	**<.001***
Materialism: Total score	0.001	0.128	-0.252	0.252	1.000
Interaction: Sex by Materialism	0.140	0.133	-0.121	0.401	.294
Interaction: Age by Materialism	0.152	0.047	0.059	0.245	**.001***
[3]Model-2 (motives): testing interaction parameters					
Sex (0=female; 1=male)	20.078	0.825	18.460	21.695	**<.001***
[1]Group of age (0=younger; 1=older)	-24.654	1.578	-27.746	-21.561	**<.001***
Motive for gambling: Enhancement	-0.543	0.105	-0.749	-0.337	**<.001***
Motive for gambling: Social	-1.071	0.102	-1.271	-0.871	**<.001***
Motive for gambling: Coping	0.259	0.084	0.095	0.423	**.002***
Interaction: Age by Motive Enhancement	0.133	0.134	-0.129	0.396	.319
Interaction: Age by Motive Social	2.600	0.162	2.282	2.918	**<.001***
Interaction: Age by Motive Coping	-0.244	0.113	-0.466	-0.022	**.031***
Model-3 (cognitions): testing interaction parameters					
Sex (0=female; 1=male)	6.606	2.963	0.799	12.414	**.026***
[1]Group of age (0=younger; 1=older)	-4.900	1.116	-7.087	-2.713	**<.001***
Gambling cognitions: Total score	0.001	0.102	-0.200	0.200	1.000
Interaction: Sex by Gambling Cognitions	0.105	0.103	-0.097	0.307	.307
Interaction: Age by Gambling Cognitions	0.052	0.016	0.020	0.084	**.002***

Note. [1]Groups of age based on the median in the sample.

[2]Single effects for groups of age defined by the median in the sample.

[3]The interaction parameters between motives for gambling with sex were not tested since the low frequency of women did not allow fitting.

*Bold: significant parameter (.05 level).