

**Pathological gambling in adolescence:
a narrative review**

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Abstract

Pathological gambling is an emerging and increasing phenomenon in Western countries. This work is aimed at reviewing the existing literature on this topic, paying special attention to its development, course and outcome in adolescence. We will explore epidemiological data, the instruments for the diagnostic and clinical assessment, the course and the outcome of the disorder, the comorbidity with other psychiatric syndromes and disorders. The main risk factors will be described at individual, social and community level. We provide an overview of the available pharmacological and psychological treatments and we report a

clinical vignette in order to describe the psychological and psychopathological features of pathological gambling in adolescence.

Key words: gambling, adolescence, epidemiology, comorbidity, childhood trauma, social risk factors, diagnosis, treatment.

Introduction

Problematic and pathological gambling behaviours in adolescence are receiving increasing attention in the last decade as an emerging target for psychological, educational, and public health interventions. Gambling Disorder has been included into the new class of substance-related and addictive behaviours disorders of the Diagnostic and Statistical Manual of Mental Disorders, 5th edition, DSM-5 (American Psychiatric Association, 2013). The diffusion of pathological gambling among adolescents is due to a number of factors. First, gaming is easily to access and it is socially accepted in the Western culture (Wilber & Potenza, 2006); second, adolescents are more prone to be involved in risk-taking behaviours, as part of the psychological adjustment processes that characterise this stage of the life-cycle (Shead, Derevensky & Gupta, 2010).

An early onset of the disorder is strongly associated to a more severe and chronic course of the disease and to several comorbidities (Kessler et al., 2008; Nower et al., 2013); thus, primary and secondary prevention strategies should be applied in this stage of life.

Prevalence

According to the American Psychiatric Association, the lifetime prevalence of gambling disorder in the adult population is estimated between 0.4% and 1.0%. The disease is far more common in men than in women (3:1) and it is more common among ethnic minorities (i.e. 0.4% whites vs. 0.9% African Americans) (American Psychiatric Association, 2013). Ethnic minorities are more likely to be involved in at-risk gambling behaviours and to experience negative consequences. The prevalence of pathological gambling (PG) is higher in the youth population. A recent literature review report a prevalence of problematic and pathological

gambling ranging from 0.9% to 7.0% in United States, from 0.8% to 7.0% in Europe and Northern Countries, and from 1.0% to 13.0% in Australia and New

Zealand. As in adulthood, among youths gambling is more common in men (Volberg et al., 2010).

According to the review of Volberg and colleagues adolescents prefer social and private gaming such as card games or sport betting; only few teens engage into age-restricted gambling activities (i.e. casino) (Volberg et al., 2010). Problematic or pathological gamblers are more likely to be involved in machine gambling (i.e. slot machines or poker machines), non-strategic gambling (i.e. lotteries, bingo, and scratch tickets), and on-line gambling; they use to gamble across multiple settings such as Internet, school, and casino (Rahman et al., 2012; Yip et al., 2014). It was suggested that on-line gambling is particularly appealing for teens because of the greater accessibility, the relatively high frequency of events, the inflated payout rate in demo sessions, and the multi-sensorial and highly involving experience they provide (King et al. 2010; Brezing et al. 2010).

In Italy, a recent survey carried out among the high school students (n=2853) of Barletta (Southern Italy), showed a prevalence of pathological gambling affected 7% of the sample (9.7% males and 2.9% females) (Villemilla et al., 2011). Another survey involving 1023 high school student in Southern Italy estimated that 6% of the sample was affected by problematic gambling (Di Martino et al., 2006). A study run in Florence, involving 275 high school students, found that 16% of those affected by pathological gambling also showed several addictive behaviours and familial problems (Pallanti, Bernardi & Quercioli, 2006). Differently from the previous studies, in this research pathological gambling was assessed using a multidimensional, rather than a specific, questionnaire for addictive behaviours so the discrepancy of findings might be due to methodological differences in assessing the disorder. Unfortunately, none of these studies investigated the type and setting of gambling.

Onset, course, and comorbidity

Both retrospective (Kessler et al., 2008; Shaffer & Hall, 2001) and prospective studies (Vitaro et al., 2004; Winters et al., 2005) suggested that pathological gambling in adulthood is often associated to an earlier age of first gambling behaviours and to “at-risk” or pathological gambling in adolescence. In the National Comorbidity Survey Replication, problematic gamblers reported their first engagement in gambling 7 years earlier than social gamblers (Kessler et al., 2008). Vitaro and colleagues (Vitaro et al., 2004; Wanner et al., 2006) implemented in gambling and marijuana abuse Moffitt’s (1993) classification of antisocial behaviours that compares late-onset antisocial behaviours, which tend to decrease in adulthood (so called “adolescence-limited”), with early-onset antisocial behaviours, which persist over time and culminates in personality disorder (so called “life-course persistent”). Accordingly, they suggested that early-onset gambling behaviours are associated with more severe and chronic course compared to late-onset. However, other prospective studies have questioned the model, suggesting that the course of youth gambling is less predictable than antisocial traits, and that only 25% of early gamblers (i.e., those who started before 15 years of age) kept the same frequency of gambling until they reached adulthood (Delfabbro, Winefield & Anderson, 2009; Delfabbro, King & Griffiths, 2014; Vitaro et al., 2004).

The frequent comorbidity of pathological gambling with a wide range of psychiatric disorders provides further evidence supporting the complexity and the multifactorial nature of the disorder. Comorbidity with other psychiatric disorders is associated to an increased risk of relapse, greater chronicity of the disease and a higher risk of drop-out to treatment (La Barbera & Martinella, 2010). Youths with gambling problems are likely to engage in several, comorbid, addictive behaviours; this might be explained by the “reward syndrome” a common psychopathological dimension underlying these behaviours. Indeed, surveys in populations of college students indicated overlapping addictions to legal substances (alcohol, caffeine, and cigarettes) and behavioural addictions such as exercising, internet, and television (Greenberg, Lewis & Dodd, 1999). In addition, in a sample of Italian students aged between 13 and 20 years, pathological gambling positively correlated with several addictive behaviours, such as

compulsive buying, exercise addiction, and internet addiction (Villella et al., 2011). Adolescent engaging in internet gambling are particularly at risk for

developing problematic Internet use and Internet addictive behaviors (Critselis et al., 2013; Griffiths et al., 2009; Griffiths & Barnes, 2008; Griffiths, 2003; Ladd & Petry, 2002) possibly because of a common vulnerability for problematic internet use and gambling (Villella et al., 2011).

Evidence suggests an association between alcohol, cigarettes smoking, illicit drug use and pathologic gambling among adolescents (Gupta & Derevensky, 1998a); teenagers with pathological gambling are at higher risk of alcohol and substance use (Hardoon, Gupta & Derevensky, 2004). Pathological gambling and alcoholism seem to share a common genetic vulnerability (Potenza 2008), cocaine craving and gambling urges share similar correlates (Potenza 2008), pathological gambling and substance dependence show similarities based on neurocognitive and functional neuroimaging studies (Van Holst et al., 2010). Adolescent problematic gamblers were more likely to report alcohol and drug use, abuse and dependence than adolescent without problematic gambling (Lynch, Maciejewski & Potenza, 2004).

Problematic gambling among adolescents is associated to high levels of depressive symptoms (Bonnaire, Bungener & Varescon, 2009; Molde et al., 2009; Shead, Derevensky & Gupta, 2010), marked anxiety (Gupta & Derevensky, 1998b; Shead, Derevensky & Gupta, 2010), and suicidal ideation and suicide attempts (Frank, Lester & Wexler, 1991; Gupta & Derevensky, 1998a; Nower, Derevensky & Gupta, 2004). There are gender differences in psychiatric comorbidities: anxiety and depressive symptoms are more common in women; substance abuse in men (Echeburúa et al., 2011; Grant et al., 2012; Ibáñez et al., 2003). Girls who gamble are more likely to report dysthymia/depression in association with gambling than boys (Desai et al., 2015), while the co-occurrence

of substance use and gambling was significantly more prevalent among males than females (Lee et al., 2012).

Furthermore pathologic gambling is often associated with attention deficit hyperactivity disorder (ADHD) (Kessler et al., 2008), conduct disorder, and criminal behavior (Hardoon et al., 2004). Adolescents affected by ADHD, aged 12 to 18 year, were significantly more likely than those without ADHD to show problematic gambling behaviors (Faregh e Derevensky, 2011). In a student population 37.5 % of those with gambling addiction also fulfilled the diagnostic criteria for ADHD (Romo et al., 2014).

Diagnosis and clinical assessment

Since its first inclusion in the DSM-III (American Psychiatric Association, 1980), the American Psychiatric Association criteria have been the benchmark for the diagnosis of pathological gambling and the basis for developing psychometric instruments to assess adults and adolescents. Originally developed from Dr. Custer clinical experience with pathological gamblers and classified as Impulse control disorder, criteria for pathological gambling were revised and formally tested in view of the DSM-IV (American Psychiatric Association, 1994): although the disorder was still classified under the Impulse control disorder, the criteria were carefully modified in order to make them resembling the substance dependence criteria, through the inclusion of tolerance and withdrawal symptoms. Finally, the 5th edition of DSM (American Psychiatric Association, 2013) moved the syndrome to the Substance-related and Addictive disorders class and relabelled it as gambling disorder in order to reduce the social stigma associated to previous definition.

The clinical threshold for the disorder was lowered from 5 to 4 criteria, some of the criteria were slightly reworded, and the criterion “has committed illegal acts such as forgery, fraud, theft or embezzlement to finance gambling” was deleted by the list, given the insufficient evidence supporting the involvement in criminal activities as a distinct feature of the disorder. Despite the efforts of DSM-5 aimed

at better specifying the diagnostic criteria according to the different age-range (as the Manual, for instance, for post-traumatic stress disorder) criteria are not differentiated for adolescents and adults.

Psychometric instruments to assess gambling disorder in youth are mostly based on DSM-IV criteria for pathological gambling for adults or adapted from instruments originally designed for adulthood and, therefore, they might be affected by the possibility that younger gamblers do not fully recognize themselves in the behaviours and in the psychological experience of adult gambler. Moreover, the cut-off employed by these instruments is somewhat lower than the cut-off used by the corresponding adult versions, introducing the possibility of measurement bias in the prevalence estimate (Stinchfield, 2010; Volberg et al., 2010).

The South Oaks Gambling Screen – Revised for Adolescents (SOGS-RA) (Winters, Stinchfield e Fulkerson, 1993) is a 12-items self-administered questionnaire, derived from the South Oaks Gambling Screen for adults (Lesieur e Blume, 1987) that inquires about 12 gamble-related behaviours and feelings experienced in the past 12 months. Each item can be rated as yes (1) or no (1) and a total score is calculated as the sum of the items. According to the most accepted narrow criteria, the total score is interpreted as follows: score of 0-1 suggests non-problem gambling, score of 2-3 indicates at-risk gambling, and score of 4 or more suggests problem gambling (one point lower than the SOGS cut-off). The Italian version of SOGS-RA has been recently validated on a sample of 14.910 students aged 15-19 years (Colasante et al., 2014). Both the original version and the Italian translation (SOGS-RA-I) of the questionnaire demonstrated good internal consistency (alpha 0.8 and 0.78 respectively), satisfying temporal stability (kappa 0.57 and 0.53-0.80, respectively), good concurrent validity (correlation between SOGS-RA and DSM-IV-MR-J $r=0.79$), and criterion validity (association between SOGS-RA-I and frequency of gambling $p<0.001$) (Colasante et al., 2014; Stinchfield, 2010). Principal component analysis of the SOGS-RA identified a three-factor solution (“self-awareness of one’s problem gambling, insight into others’ assessment of one’s problem gambling, and expedient

measures to address the negative financial consequences of problem gambling”) (Poulin, 2002), while a one-factor solution was proposed for the SOGS-RA-I (Colasante et al., 2014).

The DSM-IV-Juvenile (DSM-IV-J) and the DSM-IV-Multiple Response – Juvenile (DSM-MR-J) (Fisher, 1992, 2000) are 12-items self-administered questionnaires, which cover 9 out of the 10 DSM-IV criteria for pathological gambling. All the questions refer experience and behaviours occurred during the past year. In the all items are scored 0=no or 1= yes, while in the DSM-IV-MR-J the score of eleven items range from 0=never to 3=often. In both versions some criteria are covered by more than one question. Problematic gambler is defined as the endorsement of 4 or more criteria (one less than those required by DSM-IV). Both the DSM-IV-J and the DSM-IV-MR-J showed good internal consistency (0.75 and 0.79, respectively), strong correlation with the SOGS-RA ($r=0.67$ and $r=0.69$, respectively), and principal component analysis suggested a one-factor solution (Stinchfield, 2010). Furthermore, a couple of studies comparing the DSM-IV-(MR)-J with SOGS-RA indicate that the former provides a more conservative estimates of pathological gambling than the latter (2% vs. 2.7% and 5.3% vs. 3.4%) (Derevensky & Gupta, 2000; Olason, Sigurdardottir & Smari, 2006). A preliminary 9-item Italian adaptation of the DSM-IV-MR-J was administered to 1023 high school students, but psychometric properties of the instruments were not calculated (Di Martino et al., 2006).

The Gambling Related Cognitions Scale (GRCS) (Raylu & Oei, 2004) is a 23-items self-report scale to assess gambling related beliefs and cognitions. Differently by the previous questionnaires, this scale does not assess the severity of gambling behaviours but some of the reasoning bias that are regarded as contributory causes for the disorder. Particularly, the scale inquire five type of beliefs: gambling expectancies (related to the positive effects of gambling, i.e. reducing anxiety and stress), illusion of control (associated to the perceived control on the outcomes of gambling behaviour), predictive control (referred to the possibility of anticipating gambling outcomes), inability to stop gambling (associated with failed attempts to stop gambling), and interpretative bias (related to biased attribution processes of gambling outcomes). Each item is rated on a 7-

point likert scale, from 1=strongly agree to 7=strongly disagree, mean scores are calculated for the 5 subscales and a total score is determined from their sum. Both the original and the Italian translation of the GRCS, the latter tested on a youth

sample, demonstrated excellent internal consistency (alpha 0.93 and 0.91, respectively), good concurrent validity with the SOGS and SOGS-RA ($r=0.43$ and $r=0.56$, respectively) and a 5-factor structure (Donati et al., 2015; Raylu & Oei, 2004).

Risk and protective factors

The development of pathological or problematic gambling in youth is related to a variety of individual, interpersonal, and community risk factors, here briefly summarized.

Individual-level risk factors

Impulsivity and disinhibition, sensation and novelty seeking, anxiety and harm avoidance have been the individual-level most investigated risk factors for youth gambling. Consistent evidence from prospective studies support the view that high impulsivity in early adolescence is the best predictor of gambling severity in late adolescence and early adulthood, and that the effect of impulsivity on gambling is neither confounded by early gambling behaviour, nor by other social or personality variables (Slutske, Jackson & Sher, 2003; Vitaro, Arseneault & Tremblay, 1999). In addition, high impulsivity and low anxiety differentiated late-onset gamblers by early-onset chronic gamblers (Vitaro et al., 2004). Intriguingly, recent studies went on to claim that high impulsivity and disinhibition at 5-8 years of age predicted gambling severity at 10-12 years of age, independently by the effect of parental gambling and low inhibition or anxiety (Pagani, Derevensky & Japel, 2009; Vitaro & Wanner, 2011). Together with impulsivity, sensation and novelty seeking are regarded as personality risk factors for pathological gambling. In fact, problematic gamblers referred higher sensation and novelty seeking than non-gamblers (Martinotti et al., 2006; Nower et al., 2004) and novelty seeking predicted extensive gambling in college students (Goudriaan et al., 2009).

Furthermore, sensation seeking in problematic gamblers was associated with avoidant- and emotion-focused coping strategies, suggesting that gambling behaviours might result from the inability to delay gratification and the need to relieve stress and boredom throughout activities implying a high degree of sensory and mental stimulation (Bergevin et al., 2006; Nower et al., 2004).

At a biological level, high impulsivity was related to genetic and biochemical abnormalities in mesolimbic dopamine transmission, which plays a key role in regulating reward experiences and arousal levels. Reduced sensitivity of dopamine receptors D2-D4 are thought to underline the so called “reward deficiency syndrome” that, in turn, increases the propensity to engage in impulsive and addictive behaviours such as pathological gambling but also to other impulsive-spectrum disorders (substance use disorders, sexual addictions) or to develop other syndromes (ADHD and Tourette’s syndrome) (Goudriaan et al., 2004). Consistent evidence also suggests a dysfunction of the noradrenergic transmission, which modulates reward-dependent behaviours and arousal levels, and of the serotonergic transmission, which is responsible of self-control and harm-avoidance behaviours, balancing the activity of the dopaminergic system (Grant, Brewer & Potenza, 2006). Neuroimaging studies have pointed out the different developmental paces of the dorso-lateral pre-frontal cortex compared to the ventro-medial prefrontal cortex and sub-cortical limbic areas such as amygdala and nucleus accumbens: while the former continue maturing until early adulthood, the latter are already developed in early adolescence (Yurgelun-Todd, 2007). This imbalance might determine a higher sensitivity to emotional cues (Guyer et al., 2008), an exaggerate response to immediate rewards (Galvan et al., 2006) that are poorly modulated by top-down processes and an increased liability to affective symptoms and risk-taking behaviours. Consistently with these findings, pathological gamblers presents impaired executive functions such as decision making, inhibitory control, time estimation, cognitive flexibility, and planning, which reflect dysfunction in prefrontal cortex circuitry (Goudriaan et al., 2004). However, this evidence has not been always replicated in youth population; while a study by Van Leijenhorst and colleagues reported that high risk decision making was associated with increased ventro-medial prefrontal

cortex activity (Van Leijenhorst et al., 2010), another found an inverse relationship (Christakou et al., 2013); additionally, according to another study,

early-onset chronic gamblers did not significantly differ from late-onset gamblers in their executive function performance (Betancourt et al., 2012).

Together with impulsivity and sensation seeking, youth gamblers frequently show negative emotions (anxiety and depression) and alexithymia (difficulty in identifying, express, and regulate negative emotions and feelings). Several studies reported that depression, anxiety, and low self-esteem were associated to problematic gambling and that gambling might alleviate these affects, providing positive feeling of pleasure and excitement (Shead, Derevensky & Gupta, 2010). Moreover, according to prospective studies, depression severity predicts gambling severity in youth (Gupta et al., 2013; Martin et al., 2014), although it is not clear if depression synergistically interacts with impulsivity in increasing the risk for problematic gambling (Dussault et al, 2011) or if they act as independent risk factors. Alexithymia has been consistently associated with gambling severity in adulthood (Toneatto, Lecce & Bagby, 2009; Lumley & Roby, 1995), but only a few studies examined the relationship in adolescents (Parker et al. 2005). During adolescence, the inability to discriminate, express, and manage emotions and feelings would result in addictive behaviours – such as gambling – as the only way to modulate painful mental states (Lumley & Roby, 1995). Furthermore, externally oriented thinking that tend to focus on external events more rather than inner experiences, would increase behavioural impulsivity. In samples of adult gamblers, alexithymia has been associated with reasoning biases and high motivation to gamble (Mitrovic & Brown, 2009), impulsiveness and dissociation (Croce, Picone & Zerbetto, 2010), sensation seeking and depression (Bonnaire, Bungener & Varescon, 2009).

A growing body of literature investigated cognitive and reasoning biases in teen gamblers, claiming that – similarly to adults – they are affected by a number of

irrational beliefs (Goodie & Fortune, 2013): for instance, they believe in good luck and in their control over random events (Chiu & Storm, 2010; Moore & Ohtsuka, 1997). Gambling was associated with mistaken views of randomness (including the gambler's fallacy) (Delfabbro, Lahn & Grabosky, 2006; Donati, Chiesi & Primi, 2013) and optimistic attitudes toward the profitability of gambling (Delfabbro et al. 2009). For instance, in an Australian study, around half of the student sample over-estimated the chances of winning a standard lottery by a factor of eight times, and those classified as pathological gamblers were more likely to be optimistic about the nature of gambling as a good way to make money (Delfabbro et al., 2006). Adolescents with learning disabilities seem particularly prone to reasoning biases and false beliefs underlying pathological gambling (Taylor et al., 2014).

Interpersonal-level risk factors

Problematic and pathological gambling in youth were associated with parental history of problematic gambling, perceived parental permissiveness toward gambling, and a number of childhood adversities such as death or separation from parents, maltreatments and abuses, and low socio-economic familiar status (Shead, Derevensky & Gupta, 2010).

Youths who experienced family problems and low parental support are at increased risk to develop pathological gambling, and, conversely, family cohesion is associated with reduced gambling behaviour (Dickson, Derevensky & Gupta, 2008; Langhinrichsen-Rohling et al., 2004). However, the association between family support and gambling behaviours is not fully understood: for instance, a study carried out in predominantly African-American adolescents found that high family support was related to a higher risk of involvement in problematic gambling (Wickwire et al., 2007). Parental attitudes toward gambling play a key role in youth gambling: perceived parental permissiveness toward gambling was related with multiple risky behaviours in adolescents (i.e., gambling, alcohol use,

and cigarette smoking) and these relationships were stronger among students who reported higher sensation seeking. Interestingly, perceived parental permissiveness toward gambling is strongly linked both to gambling and also to substance-use behaviours. A less permissive attitude by parents toward gambling

appeared to be a protective factor on gambling, alcohol and cigarette use, even among those with high sensation-seeking. Therefore, reducing parental permissiveness toward gambling may be a valuable intervention goal, particularly for parents of adolescents with high sensation-seeking traits (Leeman et al., 2014). Moreover, higher rates of gambling were found among adolescents whose parents were pathological gamblers themselves (Magoon & Ingersoll, 2006; Messerlian & Derevensky, 2009) and youth gambling frequency was related both to their parents gambling frequency and the severity of parental gambling (Vachon et al., 2004). In fact, individuals who had a parent affected by problematic gambling during their early adolescence were seven times more likely to meet the criteria of problem gambling in early adulthood (Winters et al., 2002) and this effect seems stronger in girls (Donati et al., 2013b) and in early-onset teen gamblers (Grant et al., 2009).

Childhood abuse and neglect are well established risk factors for addictive disorders, including pathological gambling. In adults, self-reported childhood abuse and neglect are more prevalent among pathological gamblers than unaffected controls and there was an association between severity and frequency of the adversities and the severity of gambling behaviours (Black et al., 2012; Hodgins et al., 2010; Petry & Steinberg, 2005). Additional findings from retrospective studies demonstrated that teenagers who gamble were more likely to have been exposed to interpersonal violence and sexual abuse before 16 years of age (Hayatbakhsh, 2013; Lee et al., 2012). The effect of childhood adversities and life events on pathological gambling seems to be partially independent by the effect of other genetic and environmental exposures (Tang & Wu, 2011): for instance, a cohort study on twin pairs who were discordant for gambling behaviours demonstrated that, after controlling for genetic and environmental

covariates, child abuse and neglect were associated to a double to five-fold risk of pathological gambling (Scherrer et al., 2007). Furthermore, evidence of a dose-response effect was described between the severity of childhood abuse and the severity of gambling behaviours (Felsher, Derevensky & Gupta, 2009), between the severity of sexual abuse and the average weekly gambling expenditure (Hayatbakhsh, 2013), and between the number of adverse life events and the frequency of gambling (Storr et al., 2012).

According to Jacobs' conceptual frame (1986), gambling experience helps the individual to avoid feelings of depression, inadequacy, and helplessness derived by having been abused or neglected. By this point of view, the association between childhood adversities and youth gambling is mediated by negative mood, affect dysregulation, and dissociation. Indeed, a preliminary study on the adult population showed that affect dysregulation, identity instability, and relational difficulties mediated the effect of childhood abuse of gambling motivation (i.e. enhancement and coping motives vs. social motives); nevertheless, no effect of such motivations on gambling behaviours frequency and severity was detected (Parikh, 2012).

Community-level risk factors

The propensity to gamble is likely to be affected by social factors such as community rules that promote gambling, consumerism culture, the loss of the sense of money, mass media, advertising, slogans that enhance gamble activities (Donati, Chiesi & Primi, 2013; Griffiths, 2003; Lavanco & Varveri, 2006; Wilber & Potenza, 2006). There is probably a relationship between the availability and the accessibility of gambling, the rates of gambling, and the development of pathological gambling (Fisher, 1992).

Although in several countries gambling is illegal for people under age 18–21 years, recent literature reported a dramatic increase of pathological gambling among adolescents (Turchi & Derevensky, 2006). Italian law expressly prohibits minors to access gaming machines and to bet. Moreover, in 2011 the Italian “Law of stability” sanctioned “the ban on participation in public games with cash prizes for under-eighteen”. However, the number of children who, despite the ban,

gamble in on-line sites, bingo halls and rooms of sports betting has recently grown from 860 thousand to over 3 million. With the exception of casinos, where the controls are strict, gambling opportunities are easily accessible in tobacco shops, bars and betting shops (Lupelli, 2011). Furthermore, gambling is promoted

by several online sites and television channels by celebrities and sports men suggesting how easy is to win a lot of money with low efforts (Bastiani et al., 2013). Since increased exposure to gambling opportunities and a tolerant cultural attitude toward gambling is a significant risk factor for the community, the Italian National Campaign against the risks of gambling “Mettiamoci in gioco”, promoted the importance of reducing advertisement of gambling in all time slots and in each TV channels, also keeping in great consideration those dedicated to sport, or series for children (Mettiamoci in gioco, Comunicato Stampa, 24 feb 2015). The spread of Internet use every time and everywhere through personal computers, tablets, smartphones and new telematics devices, led to an increase in gambling online, which is particularly appealing for teenagers. The study *Espad@Italia 2014*, conducted by the Department of Epidemiology and Health Services Research of the Institute of Clinical Physiology of the National Research Council of Pisa, Italy (IFC, CNR) on 30,000 students from 405 Italian high schools showed that 41% of Italian students lives in less than five minutes walk from a place where it is possible to gamble, as well as the 37% attend a school just next. This research highlighted that 35% of teen-agers gamble at home or from friends, 17% gamble online and the proportion is more than doubled among problematic gamblers (53%) (Molinaro, 2015).

A clinical vignette

V. is a 31 years old, unemployed, single, male patient, who currently lives with his step-mother and sister. He began his gambler career during his adolescence and he has never faced this problem, although he has been involved in two psychotherapies.

Born in Bucarest (Romania), V. was adopted when he was five years old by an Italian couple, together with another little girl who lived with him in the Romanian orphanage. He refers to know nothing about his original family and he has only vague memories of the time spent in orphanage. He only remembers very well the daily violence perpetrated by the staff, his fear, sadness, and loneliness. When he arrived in Italy with his new family and he settled in his new house, he thought that was “like a dream” and that “he was able to obtain everything”. He spent a serene childhood, with a severe father and an accommodating and caring mother. V. gave especial consideration and trust to his father, who mainly cared of the children’s education, establishing a preferential relationship with him. By contrast, he tended to devalue his mother, perceived as irrelevant and easily manipulable, just good enough to satisfy his needs and wishes.

His father died when he was 13 years old, his mum became the head of the household, V. discovered scratchcard and he became, rapidly, an addicted. He spent all his money in gambling, betting more and more money, leaving high school, distancing from friends, getting into debt with banks, friends, shops, finance companies, and usurers. His mother helped him in sorting out debts with everybody, hoping that he gave up gambling; but it did not happened and she was always described by his son as “an ATM machine”. Many years later, at 31 years old, V. felt was it was the right moment to stop gamble, not just to please his mother but because gambling “destroyed his life”. Throughout his psychotherapy, two events seem to be relevant to understand his pain and the reasons of gambling: the violence in orphanage and the death of his dad. These two traumas deeply signed his development and his personality and he used gambling to alleviate and “frozen” his pain, anger, and shame. Moreover, the early age of onset influenced his cognitive functioning: he found in the scratch-card his paradise where everything was possible: losing and winning a lot of money, having money always and enough to gamble, being helped and protected by his mother. He did not learn to pay for his mistakes and he did not understand that his behaviour might affect the quality of life of many people (himself, his mum, and his sister). At 31 years old, even if he looks like a suffering man, he has not

sufficient cognitive and psychological instruments to change his life and to stop definitely gambling. Therefore, although he is able to withdraw from gambling for 2-3 months, then, he goes back to gamble. His life style, his identity, his cognitive functioning have been built together with gambling and perhaps it will always be so, unfortunately.

Treatments

Several major morphological and functional changes occur in the human brain during adolescence, and this suggests that treatments for adults might not act in the same way in teenagers. Treatments in adolescents may differ according to brain maturational stage, which is influenced by genetic, environment, neurotrophic, and hormones (estrogen, progesterone and testosterone) which play a crucial role in myelination. Thus, differences in central nervous system functioning and hormonal changes may influence adolescents' response to various drugs. Although there is not any Food and Drug Administration (FDA) approved medication for pathological gambling, opioid antagonists, antidepressants, mood stabilizers, and glutamatergic agents have been examined for the treatment of PG in adulthood.

Naltrexone, a μ -opioid receptor antagonist, seemed more effective in reducing the intensity of urges to gamble, gambling thoughts and gambling behaviour (Kim et al., 2001). This finding was replicated in a larger study of 77 subjects who were randomized to either naltrexone or placebo over an 18-week period. Naltrexone-treated subjects had significantly greater reductions in PG-YBOCS (Yale-Brown Obsessive Compulsive Scale modified for pathological gambling) total score, in gambling urges, gambling behaviour, gambling severity and in psychosocial functioning than subjects assigned to placebo (Grant, Kim & Hartman, 2008). Naltrexone is well tolerated in young patients with autism (Campbell et al., 1993; Kolmen et al., 1995) and in adolescents affected by alcoholism (Deas et al., 2005; Litrack et al., 1997), but there are not sufficient data of its efficacy and safety in adolescents affected by PG. Another opioid receptor selective ligand, Nalmefene was investigated in a large multi-centric trial, where proved to be more effective

than placebo in reducing gambling urges, thoughts, and behaviours (Grant, Potenza et al., 2006).

Serotonin Selective Re-uptake Inhibitors (SSRI) are helpful to manage depression and anxiety in adolescents with pathological gambling behaviours, as well as in lowering impulsivity (Grant, Kim e Potenza 2003). Fluvoxamine, (SSRI), has shown mixed results in two placebo-controlled trials of adults with pathological gambling: one supporting its efficacy (Hollander et al., 2000), the other failing to prove a better outcome than placebo (Blanco et al., 2002). Paroxetine demonstrated to be more efficacious than placebo in pathological gambling in the study of Kim and colleagues (2002), but not in another multi-centre study (Grant et al., 2003). Escitalopram showed efficacy in decreasing gambling and co-occurring anxiety symptoms (Grant & Potenza, 2006) and seems to be effective and well tolerated in the treatment of pathological gambling (Black et al., 2007). Since pathological gambling is often associated to obsessive-compulsive spectrum disorder, which is underlined by serotonergic dysfunction (Moreno, Saiz-Ruiz & López-Ibor,1991), it was suggested the efficacy of clomipramine, a tricyclic antidepressant approved by FDA for the treatment of obsessive compulsive disorder (OCD) in adolescents. Indeed, three studies confirmed efficacy and safety of clomipromine in teenagers (DeVeough-Geiss et al., 1992; Flament & Rapoport, 1986) and a case report reported the efficacy in reducing pathological gambling behaviour (Hollander et al., 1992).

Among mood stabilized, lithium was superior to placebo in decreasing the thoughts and urges associated to pathological gambling (Hollander & Pallanti, 2002). Given its general safety in adolescents and its efficacy in treating adult with pathological gambling, lithium might be a potentially treatment for adolescents with gambling disorders. Findings from a study conducted by Pallanti and colleagues (2002) suggested the efficacy of both lithium carbonate and valproate in the treatment of PG (Pallanti et al., 2002). Further studies suggested the effect of topiramate (Berlin et al., 2013) and carbamazepine (Black, Shaw & Allen, 2008) in reducing impulsivity, obsessivity, and compulsivity associated with pathological gambling, but replications in youth samples are needed.

Finally, N-acetyl cysteine (NAC), a glutamate modulating agent, demonstrated significant reduction in pathological gambling symptoms in adults and in marijuana addiction and autism in children and adolescents (Grant, Kim, & Odlaug, 2007). Acamprosate (an NMDA receptor antagonist and an enhancer of GABAergic transmission) showed significant effect in reducing the number gambling episodes and the obsessivity-compulsivity scores in adults with PG (Black et al., 2011), but these results have not been confirmed by other studies (Dannon et al., 2011). No studies specifically addressed the treatment with acamprosate in adolescents.

Only a few studies have investigated the efficacy of psychological treatment of adolescent PG. Psychological treatment for teens should take into account of the fact that adolescents rarely recognize excessive gambling as a problem and actively ask for professional help. Moreover, PG is often associated with multiple comorbidities which should be also treated in order to prevent relapses (Brezing, Derevensky & Potenza, 2010; Turchi & Derevensky, 2006). Primary prevention programs should be aimed at reducing the impact of known risk factors (i.e. early gambling behaviours, substance misuse, impulsivity) and to promote responsible gambling by providing correct information (an approach named “just say know” as opposed to the traditional “just say no”) (Brezing et al., 2010; Turchi & Derevensky, 2006). In Italy, there are several campaigns created specifically to control the spread of gambling behavior; there are projects carried at school aimed at raising awareness of students about the dangerousness of gambling, involving parents, teachers, and health professionals; videos and talks about this topic have been shown to be effective preventive strategies (Capitanucci, 2010; Donati, Chiesi & Primi, 2015; Lupelli, 2011; Molinaro, 2015). The aforementioned study *Espad@Italia 2014* reported a reduction of the prevalence of gambling among students as a result of prevention programs. Schools that have implemented educational programs about gambling and gambling addiction increased from 4% in 2008, to 8% in 2011, and to 16% in 2014. To some extent, the findings seemed related to the reduction of pathological (from 47% in 2009-2011 to 39% in 2014) and problematic gambling (from 11% to 7%) among individuals between 15 and 19 years (Molinaro, 2015). The Department of Health

of Sicily, within the Regional Plan for Prevention, produced guidelines for law enforcement, prevention and reduction of the risk of pathological gambling for 2015. Special attention is also paid to gambling online and youths, which is often associated to the use of tablets and smartphones. The key points of the project are reviewing the sites of gaming in the territory, possibly not too close to schools and recreational spaces for adolescents, reducing the number of game rooms, slot machines and online games; regulating the placement of gaming equipment in public places; organizing meetings at school, opening listening centres, organizing special training for operators who work in agencies providing gambling opportunities (bookmakers, tobacconists, etc.) (Alvaro, 2015).

Secondary prevention aims at the early recognition of at-risk gamblers who experience some symptoms and behaviours that, if not controlled, might lead to pathological gambling disorder. At a community level, it was suggested that telephone help-lines and youth friendly community services might promote adolescents search for help, by providing an easily accessible and confidential setting where asking questions, delivering information and education programs, and providing referral contacts (Glenn, Diaz, & Moore, 2006; Messerlian & Derevensky, 2009). Finally, tertiary prevention is targeted to the adolescent who exhibit a full syndrome and includes pharmacological and psychological treatment. According to the literature, psychodynamic, behavioural, and cognitive-behavioural models have been applied to the treatment of adolescent PG (Brezing et al., 2010; Nastally & Dixon, 2010). However, only cognitive-behavioural therapy (CBT) has documented reports of efficacy in this population. CBT for Pathological gambling includes psycho-educational intervention about the disorder, cognitive intervention on reasoning biases and irrational beliefs, social-skill and problem-solving trainings, and relapse prevention. One of the most spread CBT programs is the Canadian McGill treatment paradigm, which tailors the cognitive intervention according to the motivation and comorbidity patient's profile. Another promising approach is the adaptation of the Acceptance and Commitment Therapy (ACT) which promotes acceptance (vs. avoidance) of painful feelings and thoughts, mindfulness, cognitive defusion and flexibility, goal setting, and committed action (Nastally & Dixon, 2010). In addition,

preliminary evidence indicates the possibility to extend the 12-steps Gambling Anonymous treatment model also to the youth population (Nastally & Dixon, 2010).

Conclusions

Pathological gambling in adolescence is an important issue for public health because gambling is widely socially accepted and easily available online and offline. It is often associated to several comorbid disorders (e.g. other behavioural addictions, substance abuse, affective and anxiety disorders) which may interfere with the course of outcome of the disorder. Pathological gambling behaviours are associated to marked interpersonal, social and economic dysfunction.

Most of the knowledge of the disorder in terms of treatments and psychological interventions derives from the adult pathological gambling; further studies specifically addressed to the adolescent population are needed in order to prove the efficacy of prevention strategies, pharmacological treatments and psychological interventions.

References

1. Alvaro, L.M. (2015). Anche la Sicilia ha la sua legge no slot. *Azzardo*. Testo disponibile al sito: <http://www.vita.it/it/article/2015/03/30/anche-la-sicilia-ha-la-sua-legge-no-slot/131909/> [January 2017].
2. American Psychiatric Association. (1980). *Manuale diagnostico e statistico dei disturbi mentali, terza edizione (DSM-III)*. Milano: Masson.

3. American Psychiatric Association. (1994). *Manuale diagnostico e statistico dei disturbi mentali, quarta edizione (DSM-IV)*. Milano: Masson.
4. American Psychiatric Association. (2013). *Manuale Diagnostico e Statistico dei Disturbi mentali, quinta edizione (DSM-5)*. Milano: Raffaello Cortina.
5. Bastiani L., Gori M., Colasante E., Siciliano V., Capitanucci D., Jarre P. & Molinaro S. (2013). Complex factors and behaviors in the gambling population of Italy. *Journal of Gambling Studies*, 29(1), 1–13.
6. Bergevin T., Gupta R., Derevensky J. & Kaufman F. (2006). Adolescent gambling: understanding the role of stress and coping. *Journal of Gambling Studies*, 22(2), 195–208.
7. Berlin H.A., Braun A., Simeon D., Koran L.M., Potenza M.N., McElroy S.L., Fong T., Pallanti S. & Hollander E. (2013). A double-blind, placebo-controlled trial of topiramate for pathological gambling. *The World Journal of Biological Psychiatry*, 14(2), 121–8.
8. Betancourt L.M., Brodsky N.L., Brown C.A., McKenna K.A., Giannetta J.M., Yang W., Romer D. & Hurt H. (2012). Is executive cognitive function associated with youth gambling? *Journal of Gambling Studies*, 28(2), 225–38.
9. Black D.W., McNeilly D.P., Burke W.J., Shaw M.C. & Allen J. (2011). An open-label trial of acamprosate in the treatment of pathological gambling. *Annals of Clinical Psychiatry*, 23(4), 250–256.
10. Black D.W., Shaw M.C. & Allen J. (2008). Extended release carbamazepine in the treatment of pathological gambling: an open-label study. *Progress in Neuro-Psychopharmacology e Biological Psychiatry*, 32(5), 1191–1194.
11. Black D.W., Shaw M.C., McCormick B.A. & Allen J. (2012). Marital status, childhood maltreatment, and family dysfunction: a controlled study

of pathological gambling. *The Journal of Clinical Psychiatry*, 73(10), 1293–7.

12.Black D. W., Shaw M., Forbush K.T. & Allen J. (2007). An open-label trial of escitalopram in the treatment of pathological gambling. *Clinical Neuropharmacology*, 30(4), 206–12.

13.Blanco C., Petkova E., Ibáñez A. & Sáiz-Ruiz J. (2002). A pilot placebo-controlled study of fluvoxamine for pathological gambling. *Annals of Clinical Psychiatry*, 14, 9–15.

14.Bonnaire C., Bungener C. & Varescon I. (2009). Subtypes of French pathological gamblers: comparison of sensation seeking, alexithymia and depression scores. *Journal of Gambling Studies*, 25(4), 455–471.

15.Brezing C., Derevensky J.L. & Potenza M.N. (2010). Non-substance-addictive behaviors in youth: pathological gambling and problematic Internet use. *Child and Adolescent Psychiatric Clinics of North America*, 19(3), 625–41.

16.Campbell M., Anderson L.T., Small a M., Adams, P., Gonzalez, N.M. & Ernst, M. (1993). Naltrexone in autistic children: behavioral symptoms and attentional learning. *Journal of the American Academy of Child and Adolescent Psychiatry*, 32(6), 1283–1291.

17.Capitanucci D., Smaniotto R., Briganzoli A., Romito J.,Ponticelli T., Ladoucer R., Ferland F., Carlevaro T. & Alippi M..(2010). “Il caso, Lucky, non si può influenzare” Progetto di prevenzione e sensibilizzazione all’adozione di uno stile di gioco sano, rivolto a ragazzi della scuola primaria di secondo grado. Testo disponibile al sito: <http://www.andirete.it/portale/documenti/pdf/Sondrio> [January 2017].

18. Chiu J., & Storm, L. (2010). Personality, perceived luck and gambling attitudes as predictors of gambling involvement. *Journal of Gambling Studies*, 26(2), 205–27.
19. Christakou A., Gershman S.J., Niv Y., Simmons A., Brammer M. & Rubia K. (2013). Neural and psychological maturation of decision-making in adolescence and young adulthood. *Journal of Cognitive Neuroscience*, 25(11), 1807–23.
20. Colasante E., Gori M., Bastiani L., Scalese M., Siciliano V. & Molinaro S. (2014). Italian Adolescent Gambling Behaviour: Psychometric Evaluation of the South Oaks Gambling Screen: Revised for Adolescents (SOGS-RA) among a sample of Italian students. *Journal of Gambling Studies*, 30(4), 789–801.
21. Critselis E., Janikian M., Paleomiltou N., Oikonomou D., Kassinosopoulos M., Kormas G., & Tsitsika A. (2013). Internet gambling is a predictive factor of Internet addictive behavior. *Journal of Behavioral Addiction*, 2(4), 224–230.
22. Croce M., Picone F. & Zerbetto R. (2010). La ricerca empirica nel gioco d'azzardo patologico. In Caretti V. e La Barbera D., a cura di, *Addiction*, Milano: Raffaello Cortina Editore.
23. Dannon P. N., Rosenberg O., Schoenfeld N. & Kotler M. (2011). Acamprosate and baclofen were not effective in the treatment of pathological gambling: Preliminary blind rater comparison study. *Frontiers in Psychiatry*, 2(JUN), 1–2.
24. Deas D., May M.P.H.K., Randall C., Johnson N. & Anton R. (2005). Naltrexone treatment of adolescent alcoholics: an open-label pilot study. *Journal of Child and Adolescent Psychopharmacology*, 15(5), 723–728.
25. Delfabbro P.H., Winefield A. H. & Anderson S. (2009). Once a gambler – always a gambler? A longitudinal analysis of gambling patterns in young

people making the transition from adolescence to adulthood. *International Gambling Studies*, 9(2), 151–163.

26.Delfabbro P., King D. & Griffiths M.D. (2014). From adolescent to adult gambling: an analysis of longitudinal gambling patterns in South Australia. *Journal of Gambling Studies*, 30(3), 547–63. doi:10.1007/s10899-013-9384-7

27.Delfabbro P., Lahn J. & Grabosky P. (2006). It's not what you know, but how you use it: statistical knowledge and adolescent problem gambling. *Journal of Gambling Studies*, 22(2), 179–93.

28.Delfabbro P., Lambos C., King D. & Puglies S. (2009). Knowledge and beliefs about gambling in Australian secondary school students and their implications for education strategies. *Journal of Gambling Studies*, 25(4), 523–39.

29.Derevensky J. L. & Gupta R. (2000). Prevalence estimates of adolescent gambling: a comparison of the SOGS-RA, DSM-IV-J, and the GA 20 questions. *Journal of Gambling Studies*, 16(2-3), 227–51.

30.Desai R.A., Maciejewski P.K., Pantalon M.V. & Potenza M.N. (2005). Gender differences in adolescent gambling. *Annals of Clinical Psychiatry*, 17(4), 249–258.

31.DeVeugh-Geiss, J., Moroz, G., Biederman, J., Cantwell, D., Fontaine, R., Greist, J. H., Reicher, R., Katz R. & Landau, P. (1992). Clomipramine hydrochloride in childhood and adolescent obsessive-compulsive disorder--a multicenter trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31, 45–49.

32. Di Martino A., Vitale M.G., Ferrara V. & D'Amore, A. (2006). Ricerca-intervento sul fenomeno delle new addictions in adolescenza. *Mission*, (20), 7–16.
33. Dickson L., Derevensky J. L. & Gupta R. (2008). Youth Gambling Problems: Examining Risk and Protective Factors. *International Gambling Studies*, 8(1), 25–47.
34. Donati M. A., Ancona F., Chiesi F. & Primi, C. (2015). Psychometric properties of the Gambling Related Cognitions Scale (GRCS) in young Italian gamblers. *Addictive Behaviors*, 45C, 1–7.
35. Donati M.A., Chiesi F. & Primi C. (2013). A model to explain at-risk/problem gambling among male and female adolescents: Gender similarities and differences. *Journal of Adolescence*, 36(1), 129–137. doi: 10.1016/j.adolescence.2012.10.001
36. Donati M. A., Chiesi F. & Primi, C. (2015). Adolescenti e gioco d'azzardo. *Questioni idee in psicologia*, 15, 3–5. Testo consultabile al sito: <http://qi.hogrefe.it/rivista/adolescenti-e-gioco-dazzardo> [January 2017].
37. Dussault F., Brendgen M., Vitaro F., Wanner B. & Tremblay R.E. (2011). Longitudinal links between impulsivity, gambling problems and depressive symptoms: a transactional model from adolescence to early adulthood. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, 52(2), 130–8.
38. Echeburúa E., González-Ortega I., de Corral P. & Polo-López R. (2011). Clinical gender differences among adult pathological gamblers seeking treatment. *Journal of Gambling Studies*, 27(2), 215–227.
39. Faregh N. & Derevensky J. (2011). Gambling behavior among adolescents with Attention Deficit/Hyperactivity Disorder. *Journal of Gambling Studies*, 27, 243–256.

40. Felsher J.R., Derevensky J.L. & Gupta R. (2009). Young adults with gambling problems: the impact of childhood maltreatment. *International Journal of Mental Health and Addiction*, 8(4), 545–556.

41. Fisher S. (1992). Measuring pathological gambling in children: The case of fruit machines in the U.K. *Journal of Gambling Studies*, 8(3), 263–85.

42. Fisher S. (2000). Developing the DSM-IV criteria to identify adolescent problem gambling in non-clinical populations. *Journal of Gambling Studies*, 16(2-3), 253–73.

43. Flament M. F. & Rapoport J.L. (1986). Clomipramine treatment of childhood obsessive-compulsive disorder. *Journal of Clinical Psychopharmacology*, 6(10), 46.

44. Frank M. L., Lester D. & Wexler A. (1991). Suicidal behavior among members of Gamblers Anonymous. *Journal of Gambling Studies*, 7(3), 249–254.

45. Galvan A., Hare T. A., Parra C. E., Penn J., Voss H., Glover G. & Casey B. J. (2006). Earlier development of the accumbens relative to orbitofrontal cortex might underlie risk-taking behavior in adolescents. *The Journal of Neuroscience*, 26(25), 6885–92.

46. Glenn M. K., Diaz S. & Moore L.C. (2006). Using problem gambling helpline data to inform addiction education. *Journal of Teaching in the Addictions*, 5(1), 31–44.

47. Goodie A.S. & Fortune E.E. (2013). Measuring cognitive distortions in pathological gambling: review and meta-analyses. *Psychology of Addictive Behaviors*, 27(3), 730–43.

48. Goudriaan A.E., Oosterlaan J., de Beurs E. & Van den Brink W. (2004). Pathological gambling: a comprehensive review of biobehavioral findings. *Neuroscience and Biobehavioral Reviews*, 28(2), 123–41.
49. Goudriaan A.E., Slutske W. S., Krull J. L. & Sher K. J. (2009). Longitudinal patterns of gambling activities and associated risk factors in college students. *Addiction*, 104(7), 1219–32.
50. Grant J.E., Brewer J.A. & Potenza M.N. (2006). The neurobiology of substance and behavioral addictions. *CNS Spectrums*, 11(12), 924–30.
51. Grant J.E., Chamberlain S. R., Schreiber L.R.N. & Odlaug B.L. (2012). Gender-related clinical and neurocognitive differences in individuals seeking treatment for pathological gambling. *Journal of Psychiatric Research*, 46(9), 1206–1211.
52. Grant J.E., Kim S.W. & Hartman B.K. (2008). A double-blind, placebo-controlled study of the opiate antagonist naltrexone in the treatment of pathological gambling urges. *The Journal of Clinical Psychiatry*, 69(5), 783–789.
53. Grant J.E., Kim S.W. & Odlaug B.L. (2007). N-acetyl cysteine, a glutamate-modulating agent, in the treatment of pathological gambling: a pilot study. *Biological Psychiatry*, 62(6), 652–657.
54. Grant J.E., Kim S.W., Odlaug B.L., Buchanan, S.N. & Potenza, M.N. (2009). Late-onset pathological gambling: Clinical correlates and gender differences. *Journal of Psychiatric Research*, 43(08), 380–387.
55. Grant J.E., Kim, S.W., Potenza M.N., Blanco C., Ibanez, A., Stevens, L., Hektner J.M. & Zaninelli R. (2003). Paroxetine treatment of pathological gambling: a multi-centre randomized controlled trial. *International Clinical Psychopharmacology*, 18(4), 243–249.
56. Grant J.E. & Potenza M.N. (2006). Escitalopram treatment of pathological gambling with co-occurring anxiety: an open-label pilot study

with double-blind discontinuation. *International Clinical Psychopharmacology*, 21(4), 203–209.

57. Grant J.E., Potenza M. N., Hollander E., Cynningham-Williams R., Nurminen T., Smits G. & Kallio A. (2006). Multicenter investigation of the opioid antagonist nalmefene in the treatment of pathological gambling. *American Journal of Psychiatry*, 163(2), 303–312.

58. Grant J.E, Kim S.W. & Potenza M.N. (2003). Advances in the pharmacological treatment of pathological gambling. *Journal of Gambling Studies*, 19, 405–425.

59. Greenberg J.L., Lewis S.E. & Dodd D.K. (1999). Overlapping addictions and self-esteem among college men and women. *Addictive Behaviors*, 24(4), 565–571.

60. Griffiths M., Wardle H., Orford J., Sproston K. & Erens B. (2009). Sociodemographic correlates of internet gambling: findings from the 2007 British Gambling Prevalence Survey. *CyberPsychology & Behavior*, 12(2): 199-202.

61. Griffiths M. (2003). Internet gambling: issues, concerns, and recommendations. *Cyberpsychology e Behavior*, 6(6), 557–568.

62. Griffiths M. & Barnes A. (2008). Internet gambling: an online empirical study among student gamblers. *International Journal of Mental Health and Addiction*, 6(2), 194–204.

63. Griffiths M. D. (2003). Internet gambling: issues, concerns, and recommendations. *CyberPsychology & Behavior*, 6(6): 557-568.

64. Gupta R. & Derevensky J. L. (1998a). Adolescent gambling behavior: a prevalence study and examination of the correlates associated with problem gambling. *Journal of Gambling Studies*, 14(4), 319–345.
65. Gupta, R. & Derevensky, J. L. (1998b). An empirical examination of Jacobs' general theory of addictions: do adolescent gamblers fit the theory? *Journal of Gambling Studies*, 14(1), 17–49.
66. Gupta R., Nower L., Derevensky J. L., Blaszczynski A., Faregh N. & Temcheff C. (2013). Problem gambling in adolescents: an examination of the pathways model. *Journal of Gambling Studies*, 29(3), 575–88.
67. Guyer A.E., Monk C.S., McClure-Tone E. B., Nelson E. E., Roberson-Nay R., Adler, A. D., Fromm S.J., Leibenluft E., Pine D.S. & Ernst, M. (2008). A developmental examination of amygdala response to facial expressions. *Journal of Cognitive Neuroscience*, 20(9), 1565–82.
68. Haroon K.K., Gupta R. & Derevensky J.L. (2004). Psychosocial variables associated with adolescent gambling. *Psychology of Addictive Behaviors*, 18(2), 170–179.
69. Hayatbakhsh M. (2013). Early life course predictors of young adults' gambling. *International Gambling Studies*, 13(1), 19–36.
70. Hodgins D.C., Schopflocher D.P., el-Guebaly N., Casey D.M., Smith GJ., Williams R.J. & Wood R.T. (2010). The association between childhood maltreatment and gambling problems in a community sample of adult men and women. *Psychology of Addictive Behaviors*, 24(3), 548–54.
71. Hollander E., Frenkel M., DeCaria C., Truong S. & Stein D. (1992). Treatment of pathological gambling with clomipramine. *American Journal of Psychiatry*, 149, 710–711.
72. Hollander E., Pallanti S. & Baldini-R.N. (2002). Sustained Release Lithium/Placebo Treatment Response in Bipolar Spectrum Pathological Gamblers. Poster presented at the 42nd Annual New Clinical Drug Evaluation Unit Meeting; Boca Raton, Florida.

73.Hollander E., Decaria C.M., Finkell J. N., Begaz T., Wong C.M. & Cartwright C. (2000). A randomized double-blind fluvoxamine/placebo crossover trial in pathologic gambling. *Biological Psychiatry*, 47(9), 813–817.

74.Ibáñez A., Blanco C., Moreryra P. & Sáiz-Ruiz J. (2003). Gender differences in pathological gambling. *The Journal of Clinical Psychiatry*, 64(3), 295–301.

75.Jacobs D.F. (1986). A general theory of addictions: A new theoretical model. *Journal of Gambling Behavior*, 2(1), 15–31. doi:10.1007/BF01019931

76.Kessler, R.C., Hwang, I., LaBrie, R., Petukhova, M., Sampson, N. A., Winters, K.C. & Shaffer, H. J. (2008). DSM-IV pathological gambling in the National Comorbidity Survey Replication. *Psychological Medicine*, 38(9), 1351–60.

77.Kim S.W., Grant J. E., Adson D.E. & Shin Y.C. (2001). Double-blind naltrexone and placebo comparison study in the treatment of pathological gambling. *Biological Psychiatry*, 49, 914–921.

78.Kim S.W., Grant J.E., Adson D.E., Shin Y.C. & Zaninelli R. (2002). A double-blind placebo-controlled study of the efficacy and safety of paroxetine in the treatment of pathological gambling. *The Journal of Clinical Psychiatry*, 63(6), 501–507.

79.King D., Delfabbro P. & Griffiths M., 2010. The convergence of gambling and digital media: implications for gambling in young people. *Journal of gambling studies*, 26(2), pp.175–87.

80.Kolmen B. K., Feldman H. M., Hande, B.L. & Janosky J. E. (1995). Naltrexone in young autistic children: a double-blind, placebo-controlled

crossover study. *Journal of the American Academy of Child and Adolescent Psychiatry*, 34(2), 223–231.

81.La Barbera D. & Martinella A. (2010). Comorbilità, fattori predittivi, caratteristiche di personalità e distorsioni cognitive nei giocatori patologici. In Picone F., a cura di, *Il gioco d'azzardo patologico*. Roma: Carocci.

82.Ladd G. T. & Petry N.M. (2002). Disordered gambling among university-based medical and dental patients : a focus on internet gambling. *Psychology of Addictive Behaviors*, 16(1), 76–79. doi: 10.1037//0893-164X.16.1.76

83.Langhinrichsen-Rohling J., Rohde P., Seeley J.R. & Rohling M.L. (2004). Individual, family, and peer correlates of adolescent gambling. *Journal of Gambling Studies*, 20, 23–46.

84.Lavanco G. & Varveri L., a cura di (2006). *Psicologia del gioco d'azzardo e della scommessa*. Roma: Carocci.

85.Lee G. P., Storr C. L., Ialongo N. S., & Martins S. S. (2012). Association between adverse life events and addictive behaviors among male and female adolescents. *The American Journal of Addictions*, 21(6), 516–23.

86.Leeman R. F., Patock-Peckham J.A., Hoff, R. A., Krishnan-Sarin S., Steinberg M. A., Rugle L. J. & Potenza M. N. (2014). Perceived parental permissiveness toward gambling and risky behaviors in adolescents. *Journal of Behavioral Addictions*, 3(2), 115–123.

87.Lesieur H. R. & Blume S. B. (1987). The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. *The American Journal of Psychiatry*, 144(9), 1184–8.

88.Liffrack P.D, Alterman A.I., O' Brien C.P. & Volpicelli J.R. (1997). Naltrexone for alcoholic adolescents. *American Journal of Psychiatry*, 154, 439–441.

89.Lumley M. & Roby K.J., 1995. Alexithymia and pathological gambling. *Psychotherapy and psychosomatics*, 63(3), pp.201–206.

90.Lupelli C. (2011). Adolescenti e Gioco D’Azzardo. Testo disponibile al sito: <http://www.primoconsumo.it/public/files/gioco%20d%27azzardo%20e%20adolescenti%287%29.pdf> [January 2017].

91.Lynch W. J., Maciejewski P.K. & Potenza M.N. (2004). Psychiatric correlates of gambling in adolescents and young adults grouped by age at gambling onset. *Archives of General Psychiatry*, 61, 1116–1122.

92.Magoon M.E. & Ingersoll G.M. (2006). Parental modeling, attachment, and supervision as moderators of adolescent gambling. *Journal of Gambling Studies*, 22(1), 1–22.

93.Martin R. J., Usdan S., Cremeens J. & Vail-Smith K. (2014). Disordered gambling and co-morbidity of psychiatric disorders among college

students: an examination of problem drinking, anxiety and depression. *Journal of Gambling Studies*, 30(2), 321–33.

94.Martinotti G., Andreoli S., Giametta E., Poli V., Bria P. & Janiri L. (2006). The dimensional assessment of personality in pathologic and social gamblers: the role of novelty seeking and self-transcendence. *Comprehensive Psychiatry*, 47(5), 350–6.

95.Messerlian C. & Derevensky J. L. (2009). Youth gambling: A public health perspective. *Journal of Gambling Issues*, 14.

96.Mettiamoci in gioco: Decreto sul gioco d’azzardo, preoccupati per la direzione presa dal Governo (2015). *Mettiamoci in Gioco*. Comunicato stampa: 24 February 2015. Testo disponibile al sito: <http://www.mettiamociingioco.org/index.php>

option=com_zooeview=frontpageelayout=frontpageItemid=212 [January 2017].

97.Mitrovic D.V. & Brown J. (2009). Poker mania and problem gambling: A study of distorted cognitions, motivation and alexithymia. *Journal of Gambling Studies*, 25(4), 489–502.

98.Moffitt T.E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: a developmental taxonomy. *Psychological Review*, 100(4), 674–701.

99.Molde H., Pallesen S., Bartone P., Hystad S. & Johnsen B. H. (2009). Prevalence and correlates of gambling among 16 to 19-year-old adolescents in Norway: Personality and Social Sciences. *Scandinavian Journal of Psychology*, 50(1), 55–64.

100.Molinario S. (2015). Adolescenti d’azzardo: più prevenzione, meno giocatori.CNR. 13 March 2015.Testo disponibile al sito:<http://www.cnr.it/cnr/news/CnrNews?IDn=3204> [January 2017].

101.Moore S. M. & Ohtsuka K. (1997). Gambling activities of young Australians: developing a model of behaviour. *Journal of Gambling Studies*, 13(3), 207–36.

102.Moreno I., Saiz-Ruiz J. & López-Ibor I. J. (1991). Serotonin and gambling dependence. *Human Psychofarmacology*, 6, S9–12.

103.Nastally B.L. & Dixon M.R. (2010). Adolescent gambling: current trends in treatment and future directions. *International Journal of Adolescent Medicine and Health*, 22(1), 95–111.

104.Nower L., Derevensky J. L. & Gupta R. (2004). The relationship of impulsivity, sensation seeking, coping, and substance use in youth gamblers. *Psychology of Addictive Behaviors*, 18(1), 49–55.

105. Nower L., Martins S. S., Lin K.-H. & Blanco C. (2013). Subtypes of disordered gamblers: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Addiction*, *108*(4), 789–98.
106. Olason D. T., Sigurdardottir K. J. & Smari J. (2006). Prevalence estimates of gambling participation and problem gambling among 16-18-year-old students in Iceland: a comparison of the SOGS-RA and DSM-IV-MR-J. *Journal of Gambling Studies*, *22*(1), 23–39.
107. Pagani L. S., Derevensky J. L. & Japel C. (2009). Predicting gambling behavior in sixth grade from kindergarten impulsivity: a tale of developmental continuity. *Archives of Pediatrics e Adolescent Medicine*, *163*(3), 238–43.
108. Pallanti S., Bernardi S. & Quercioli L. (2006). The Shorter PROMIS Questionnaire and the Internet Addiction Scale in the assessment of multiple addictions in a high-school population: prevalence and related disability. *CNS Spectrums*, *11*(12), 966–74.
109. Pallanti S., Quercioli L., Sood E. & Hollander E. (2002). Lithium and valproate treatment of pathological gambling: A randomized single-blind study. *Journal of Clinical Psychiatry*, *63*(7), 559–564.
110. Parikh P.-K. (2012). *An examination of the relationship between childhood maltreatment and gambling in emerging adulthood*. Ontario Institute for Studies in Education, University of Toronto. Testo disponibile al sito: <https://tspace.library.utoronto.ca/handle/1807/33671> [January 2017].
111. Parker J.D.A., Wood L.M., Bond B.J. & Shaughnessy P. (2005). Alexithymia in young adulthood: a risk factor for pathological gambling. *Psychotherapy and Psychosomatics*, *74*, 51–55.

112. Petry N. M. & Steinberg K. L. (2005). Childhood maltreatment in male and female treatment-seeking pathological gamblers. *Psychology of Addictive Behaviors*, *19*(2), 226–9.
113. Potenza M. N. (2008). Review. The neurobiology of pathological gambling and drug addiction: an overview and new findings. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, *363*(1507), 3181–3189.
114. Poulin C. (2002). An assessment of the validity and reliability of the SOGS-RA. *Journal of Gambling Studies*, *18*(1), 67–93.
115. Rahman A. S., Pilver C. E., Desai R. A., Steinberg M. A., Rugle L., Krishnan-Sarin S. & Potenza M. N. (2012). The relationship between age of gambling onset and adolescent problematic gambling severity. *Journal of Psychiatric Research*, *46*(5), 675–83.
116. Raylu N. & Oei T. P. S. (2004). The Gambling Related Cognitions Scale (GRCS): development, confirmatory factor validation and psychometric properties. *Addiction*, *99*(6), 757–69.
117. Romo L., Rémond J. J., Coeffec A., Kotbagi G., Plantey S., Boz F. & Kern L. (2014). Gambling and Attention Deficit Hyperactivity Disorders (ADHD) in a population of French students. *Journal of Gambling Studies*.
118. Saiz-Ruiz J., Blanco C., Ibanez A., Masramon X., Gomez M. M., Madrigal M. & Diez T. (2005). Sertraline treatment of pathological gambling: a pilot study. *Journal of Clinical Psychiatry*, *66*(1), 28–33.
119. Scherrer J. F., Xian H., Kapp J. M. K., Waterman B., Shah K. R., Volberg R. & Eisen S. A. (2007). Association between exposure to childhood and lifetime traumatic events and lifetime pathological gambling in a twin cohort. *The Journal of Nervous and Mental Disease*, *195*(1), 72–8.

120. Shaffer H. J. & Hall M. N. (2001). Updating and refining prevalence estimates of disordered gambling behaviour in the United States and Canada. *Canadian Journal of Public Health*, 92(3), 168–72.

121. Shead N.W., Derevensky J. L. & Gupta R. (2010). Risk and protective factors associated with youth problem gambling. *International Journal of Adolescent Medicine and Health*.

122. Slutske W.S., Jackson K. M., & Sher K. J. (2003). The natural history of problem gambling from age 18 to 29. *Journal of Abnormal Psychology*, 112(2), 263–74.

123. Stinchfield R. (2010). A critical review of adolescent problem gambling assessment instruments. *International Journal of Adolescent Medicine and Health*, 22(1), 77–93.

124. Storr C.L., Lee G. P., Derevensky J.L., Ialongo N.S., & Martins S.S. (2012). Gambling and adverse life events among urban adolescents. *Journal of Gambling Studies*, 28(2), 325–36.

125. Tang C.S. & Wu A.M.S. (2011). Impulsivity as a moderator and mediator between life stress and pathological gambling among chinese treatment-seeking gamblers. *International Journal of Mental Health and Addiction*, 10(4), 573–584.

126. Taylor R.N., Parker J. D.A., Keefer K. V, Kloosterman P. H. & Summerfeldt L. J. (2014). Gambling related cognitive distortions in

adolescence: relationships with gambling problems in typically developing and special needs students. *Journal of Gambling Studies*.

127. Toneatto T., Lecce J. & Bagby M. (2009). Alexithymia and pathological gambling. *Journal of Addictive Diseases*, 28(3), 193–8.

128. Turchi R. M., & Derevensky J.L. (2006). Youth gambling: not a safe bet. *Current Opinion in Pediatrics*, *18*(4), 454–8.
129. Vachon J., Vitaro F., Wanner B. & Tremblay R.E. (2004). Adolescent gambling: relationships with parent gambling and parenting practices. *Psychology of Addictive Behaviors*, *18*(4), 398–401.
130. Van Holst R. J., van den Brink W., Veltman D.J. & Goudriaan A.E. (2010). Why gamblers fail to win: A review of cognitive and neuroimaging findings in pathological gambling. *Neuroscience and Biobehavioral Reviews*, *34*(1), 87–107.
131. Van Leijenhorst L., Gunther Moor B., Op de Macks Z.A., Rombouts S.A.R.B., Westenberg P.M. & Crone E.A. (2010). Adolescent risky decision-making: neurocognitive development of reward and control regions. *NeuroImage*, *51*(1), 345–55.
132. Villella C., Martinotti G., Di Nicola M., Cassano M., La Torre G., Gliubizzi, M.D., Messeri I., Petruccelli F., Bria P., Janiri L. & Conte, G. (2011). Behavioural addictions in adolescents and young adults: results from a prevalence study. *Journal of Gambling Studies*, *27*(2), 203–14.
133. Vitaro F., Arseneault L. & Tremblay R.E. (1999). Impulsivity predicts problem gambling in low SES adolescent males. *Addiction*, *94*(4), 565–75.
134. Vitaro F. & Wanner B. (2011). Predicting early gambling in children. *Psychology of Addictive Behaviors*, *25*(1), 118–26. doi:10.1037/a0021109
135. Vitaro F., Wanner B., Ladouceur R., Brendgen M. & Tremblay R.E. (2004). Trajectories of gambling during adolescence. *Journal of Gambling Studies*, *20*(1), 47–69.
136. Volberg, R.A., Gupta, R., Griffiths, M.D., Olason, D.T. & Delfabbro, P. (2010). An international perspective on youth gambling prevalence studies. *International Journal of Adolescent Medicine and Health*, *22*(1), 3–38.

137. Wanner, B., Vitaro, F., Ladouceur, R., Brendgen, M. & Tremblay, R.E. (2006). Joint trajectories of gambling, alcohol and marijuana use during adolescence: a person- and variable-centered developmental approach. *Addictive Behaviors*, 31(4), 566–80.
138. Wickwire E.M., Whelan J.P., Meyers A.W. & Murray D.M. (2007). Environmental correlates of gambling behavior in urban adolescents. *Journal of Abnormal Child Psychology*, 35(2), 179–90.
139. Wilber M.K. & Potenza M.N. (2006). Adolescent gambling: Research and Clinical Implications. *Psychiatry*, 3(10), 40–8.
140. Winters K.C., Stinchfield R.D., Botzet A. & Anderson N. (2002). A prospective study of youth gambling behaviors. *Psychology of Addictive Behaviors*, 16(1), 3–9.
141. Winters K.C., Stinchfield R.D., Botzet A. & Slutske W.S. (2005). Pathways of youth gambling problem severity. *Psychology of Addictive Behaviors*, 19(1), 104–7.
142. Winters K.C., Stinchfield R. & Fulkerson J. (1993). Patterns and characteristics of adolescent gambling. *Journal of Gambling Studies*, 9(4), 371–386.
143. Yip S.W., Mei S., Pilver C.E., Steinberg M.A., Rugle L. J., Krishnan-Sarin S., Hoff R.A. & Potenza, M.N. (2014). At-risk/problematic shopping and gambling in adolescence. *Journal of Gambling Studies*.
144. Yurgelun-Todd D. (2007). Emotional and cognitive changes during adolescence. *Current Opinion in Neurobiology*, 17(2), 251–7.

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