

## Online and live regular poker players: Do they differ in impulsive sensation seeking and gambling practice?

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*Background and aims:* Online gambling appears to have special features, such as anonymity, speed of play and permanent availability, which may contribute to the facilitation and increase in gambling practice, potentially leading to problem gambling. The aims of this study were to assess sociodemographic characteristics, gambling practice and impulsive sensation seeking among a population of regular poker players with different levels of gambling intensity and to compare online and live players. *Methods:* 245 regular poker players (180 online players and 65 live players) completed online self-report scales assessing sociodemographic data, pathological gambling (SOGS), gambling practice (poker questionnaire) and impulsive sensation seeking (ImpSS). We used SOGS scores to rank players according to the intensity of their gambling practice (non-pathological gamblers, problem gamblers and pathological gamblers). *Results:* All poker players displayed a particular sociodemographic profile: they were more likely to be young men, executives or students, mostly single and working full-time. Online players played significantly more often whereas live players reported significantly longer gambling sessions. Sensation seeking was high across all groups, whereas impulsivity significantly distinguished players according to the intensity of gambling. *Discussion:* Our results show the specific profile of poker players. Both impulsivity and sensation seeking seem to be involved in pathological gambling, but playing different roles. Sensation seeking may determine interest in poker whereas impulsivity may be involved in pathological gambling development and maintenance. *Conclusions:* This study opens up new research perspectives and insights into preventive and treatment actions for pathological poker players.

**Keywords:** poker, impulsive sensation seeking, online gambling, sociodemographic, problem gambling

### INTRODUCTION

The appearance of online gambling has led to new concerns about problem gambling. In fact, Internet gambling presents several special features, which may contribute to the facilitation and increase in gambling practice, potentially leading to problem gambling. Wood, Williams, and Lawton (2007) found that online gamblers preferred Internet gambling to live gambling, because of the convenience, comfort, ease of access, aversion to live gambling features, perception of greater potential wins and overall lower spending. Online gambling therefore appears to have specific characteristics, making it different from live gambling. Hence, it is relevant to investigate whether it attracts a specific profile of gamblers.

Several studies have investigated the sociodemographic profile of online pathological gamblers (PG), showing that they are more likely to be male, relatively young, single, with an educational level ranging from middle to high, working full-time and with a higher income than the average population (Gainsbury, Wood, Russel, Hing, & Blaszczynski, 2012; Ladd & Petry, 2002). This sociodemographic profile differs from that displayed by live PGs, described as middle-aged males, with a relatively low educational level and low income (Costes, Pousset, Eroukmanoff, & Le Nezet, 2011). In fact, Kairouz, Paradis, and Nadeau (2012) compared online gamblers to offline

gamblers and found that they were more likely to be young and male.

Online gambling thus seems to attract a different population. Griffiths and Barnes (2008) showed that men are more inclined than women to gamble on the Internet and more likely to develop gambling problems. Furthermore, online gamblers spend more time and money gambling and tend to develop more gambling problems than live gamblers. Indeed, some characteristics of online gambling, especially the anonymity of the gambler, the constant availability and convenience, may foster the faster onset of problem gambling (Griffiths & Barnes, 2008; Wood, Williams et al., 2007). For example, McBride and Derevensky (2009) assessed problem gambling among online gamblers and found a prevalence of 23%. Furthermore, according to Ladd and Petry (2002), online gambling generates more severe gambling problems than live gambling.

Poker players are overrepresented among online gamblers (Kairouz et al., 2012). The popularity of poker can be explained by the real strategy component involved in

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long-term success (Shead, Hodgins, & Scharf, 2008), and also by the involvement of celebrities in poker playing, the broadcast of poker shows on television, the possibility of learning poker for free and playing for very small amounts on the Internet (Wood, Griffiths, & Parke, 2007).

Over the last decade, several researchers have studied online poker playing, showing a prevalence of problem gambling ranging from 9% (Hopley & Nicki, 2010) to 18% (Wood, Griffiths et al., 2007) among regular poker players. Several risk factors have been identified, including dissociation, proneness to boredom, negative mood states and impulsivity (Hopley, Dempsey, & Nicki, 2012; Hopley & Nicki, 2010).

Impulsivity, a personality dimension defined as a predilection to engage in behavior without planning or considering the potential consequences (Zuckerman & Kuhlman, 2000), is often associated with pathological gambling (Steel & Blaszczynski, 1998). According to Dussault, Brendgen, Vitaro, Wanner, and Tremblay (2011), impulsivity preexists pathological gambling. Impulsivity is thus considered both a predictor (Vitaro, Arseneault, & Tremblay, 1999) and a risk factor (Petry, 2001) for pathological gambling, including poker playing (Hopley & Nicki, 2010). Impulsive individuals also present more severe gambling problems (Steel & Blaszczynski, 1998). Impulsivity is linked to another personality construct, sensation seeking, defined as the need for varied, new and complex sensations and experiences to maintain a high level of excitement (Zuckerman, Bone, Neary, Mangelsdorff, & Brustman, 1972). It has a predictive value for pathological gambling (Demaree, DeDonno, Burns, & Everhart, 2008), as well as for the severity of this disorder (Bonnaire, Bungener, & Varescon, 2006). In 1993, assuming that impulsivity and sensation seeking are linked and predict risky behaviors, Zuckerman, Kuhlman, Joireman, Teta, and Kraft (1993) proposed the concept of impulsive sensation seeking. This construct is supported by genetic evidence, with common biological mechanisms underlying the association between these traits (Hur & Bouchard, 1997).

Research results about impulsive sensation seeking are heterogeneous, showing either a correlation between this dimension and gambling (Breen & Zuckerman, 1999) or no link at all (Zuckerman & Kuhlman, 2000). This may be due to the heterogeneity of gambling itself: studies have shown that gambling is not a homogeneous activity, with gamblers having different characteristics according to the type of gambling practiced. For example, gamblers playing games in which they have an active part are high sensation seekers, gambling to experiment strong sensations and arousal, whereas gamblers playing passive games are low sensation seekers, rather seeking relief for negative affects (Bonnaire, Bungener, & Varescon, 2009).

Among poker players, Barrault and Varescon (2013a) found that all gamblers, regardless of the intensity of their gambling practice, were high sensation seekers, whereas impulsivity distinguished PGs and non-pathological gamblers (NPG) and significantly predicted pathological gambling. These results suggest that sensation seeking determines interest in poker, seen as a way of experiencing strong sensations and arousal, whereas impulsivity plays a determinant role in problem gambling. Qualitative data support

this idea: poker players, regardless of their intensity of gambling, satisfied their active search for high arousal by playing poker (Barrault, Untas, & Varescon, 2014).

The literature suggests that online gambling may have special features compared to live gambling. It would be relevant to compare live and online gamblers for the same type of game. We chose to study poker, which is one of the most popular types of online gambling but is also widely played live. To compare live and online gambling, we extended Barrault and Varescon's (2013a) study, assessing impulsive sensation seeking among online poker players, by adding a group of live poker players.

The aims of this study were to assess gambling practice and impulsive sensation seeking among poker players, and to compare the results of live and online poker players.

We hypothesized that high sensation seeking would be common to all players. However, as live gambling is characterized by more sensorial stimulations (Barrault et al., 2014), sensation seeking could be higher among live gamblers. Higher levels of impulsivity would be found among PGs compared to NPGs for both live and online groups. We also hypothesized that online and live gamblers would differ in terms of gambling practice: we expected online gamblers to play more often than live gamblers, as online gambling is constantly and easily available, but for shorter periods, as online gambling is faster than live gambling.

## METHODS

### *Participants*

Our sample was composed of regular poker players, playing at least once a week for a minimum duration of one year. Participants were required to be over 18 years of age. There was no upper age limit. To avoid bias related to the practice of other types of gambling, participants with a regular gambling practice other than poker were excluded.

A total of 245 poker players participated in the study. They were asked if they were rather live or online players and consequently divided into 2 groups: live players ( $n = 65$ ) and online players ( $n = 180$ ).

However, it was difficult to find exclusive online or live gamblers, as poker players tend to practice both. In our sample, gamblers were classified in the online or live group based on their self-report (most frequent gambling practice). As the majority of poker players reported playing both online and live, we chose to keep players in each group who reported playing the other type of gambling "occasionally" (i.e. less than once a month). In the online group, 83% played a live game occasionally while in the live group, 88% played online occasionally.

SOGS scores were used to determine their intensity of gambling, based on a nomenclature of three groups frequently used in the literature (Abbott, Romild, & Volberg, 2014; Barrault & Varescon, 2013a, 2013b), which appears to reflect more accurately the clinical reality of problem and pathological gambling, with problem gamblers having lower scores than pathological gamblers (Dickerson, 1993). Our sample was constituted of NPGs [SOGS < 3;  $n = 112$  (45%) in the online group,  $n = 34$  (13%) in the live group],

problem gamblers [PbG; SOGS score between 3 and 4;  $n = 37$  (15%) in the online group,  $n = 18$  (7%) in the live group] and PG [SOGS  $\geq 5$ ;  $n = 31$  (12%) in the online group,  $n = 13$  (5%) in the live group].

### Measures

*The sociodemographic questionnaire.* Sociodemographic data were obtained using a questionnaire (7 items) especially designed for the study, including questions on age, gender, marital status and professional status.

*The South Oaks Gambling Screen (SOGS)* (Lesieur & Blume, 1987). The SOGS is a 20-item self-report questionnaire, including criterion measures of the counselor's judgment of patients' gambling and DSM-III-R criteria for pathological gambling. Scores range from 0 to 20. Stinchfield (2002) showed the reliability and validity of this instrument in general and in clinical populations (convergent validity = .83, sensitivity level = .91 and specificity level = .99). We used the French version of the SOGS (Lejoyeux, 1999), which also displays good psychometric properties. The SOGS has proved to be a reliable instrument and is one of the pathological gambling screening tools most frequently used in research (Gambino & Lesieur, 2006).

*The Impulsive Sensation Seeking Scale (ImpSS)* (Zuckerman et al., 1993). The ImpSS scale is one of the five subscales of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ, 1993). It assesses impulsive sensation seeking and includes two subscales: impulsivity (Imp, 8 items) and sensation seeking (SS, 11 items) using false/true responses. Scores range from 0 to 19. Validation studies show good psychometric qualities (Zuckerman et al., 1993). The French validation study (Rossier, Verardi, Massoudi, & Aluja, 2008) also underlines the psychometric properties of the ImpSS subscale: internal consistency is .79 and the congruence coefficient, at the item-level, ranges from .71 to 1. For the ImpSS, the total congruence coefficient is .98 (.98 for SS and .97 for Imp).

*The poker questionnaire.* This 16-item questionnaire, designed for the present research, investigates several aspects of poker playing. Items refer to poker itself (reasons for playing poker, preferred variant), to financial aspects (average buy-in, maximum amount played) and to the characteristics of gambling practice (frequency and length of gambling sessions, age of onset and duration of gambling practice). The questionnaire was pre-tested by ten regular poker players.

### Procedure

Participants from the online group were recruited from one of the most active Internet poker-related forums in France with the permission of the webmaster. Live group participants were recruited in gambling venues. In both situations, participants received an Internet link leading to the online questionnaire. On the first page, the goals and method of the research were explained, while the second page was the consent form (including ethical information). If they agreed, participants then had access to the online questionnaires. The data were screened to exclude potential multiple responses.

### Statistical analyses

The software Statistica® (version 9) was used for the statistical analyses. The distribution was normal (assessed by measures of skewness and kurtosis). The use of the Kaplan–Meier test and the Browne–Forsythe test confirmed normality and homoscedasticity. There were no significant outliers. Comparisons for continuous variables (SOGS, ImpSS) were made using a one-way analysis of variance (ANOVA), followed by Student's *t* test to ascertain the direction of differences. For measures of effect sizes, partial eta-squared was used. For categorical data, percentages were compared with the chi-square test. Pearson's correlation coefficient was used to calculate correlations between variables. A *p*-value of 0.05 was used as a threshold of statistical significance.

### Ethics

As an ethics board approval is not needed in France, where this study took place, when studies are carried out on the adult general population, we ensured this study was conducted in accordance with the national and international norms governing the use of human research participants. Participants were informed of the goals and methods of the study. They were also informed that their involvement in the research was completely voluntary, that responses were anonymous and that they were free to withdraw at any time. All of the participants gave their written informed consent before taking part.

## RESULTS

### *SOGS scores, sociodemographic data and poker practice*

Sociodemographic data and SOGS scores are presented in Table 1. As statistical analyses (ANOVA, Student's *t* test and chi-square test) showed no significant differences between live and online poker, the entire sample of the sociodemographic data is presented here, distinguishing participants according to the intensity of their gambling practice.

The sample was constituted by a majority of men ( $n = 238$ , 97.2%), which is relatively representative of the poker player population. The mean age was 29.1 years ( $SD = 7.8$ ).

There were no significant differences between NPGs, PbGs and PGs, in terms of professional activity, socio-professional category or family situation. There were no significant differences in SOGS scores between online and live PGs.

Tables 2 and 3 present gambling practice data for live (Table 2) and online (Table 3) gamblers.

Among live gamblers, there was no significant difference between the three groups, in terms of gambling practice. Live gamblers played, on average, 3.6 times a week ( $SD = 3.1$ ) for a mean duration of 3.8 hours ( $SD = 1.8$ ). Financial motivation was reported by all PG (100%), whereas the social aspect was only reported by 38% of them. 30% of PG reported an average buy-in greater than 100 € (16% for PbG and 11% for NPG).

Among online poker players, there was a significant difference between the three groups, in terms of duration

Table 1. SOGS scores and sociodemographic data (total sample)

	NPG (n = 146) Mean (SD)	PbG (n = 55) Mean (SD)	PG (n = 44) Mean (SD)	Total (n = 245) Mean (SD)	ANOVA F	p
AGE	29.60 (8.00)	28.16 (7.50)	28.86 (7.70)	29.14 (7.86)	0.70	0.49
SOGS	0.94 (0.76)	3.43 (0.50)	6.84 (2.11)	2.56 (2.49)	511.19	< 0.01
	N (%)	N (%)	N (%)	N (%)	Chi	p
PROFESSIONAL ACTIVITY					4.80	0.90
Full-time	76 (52.05)	29 (52.72)	22 (50.00)	127 (51.83)		
Part-time	9 (6.16)	3 (5.45)	2 (4.54)	14 (5.71)		
Irregular	8 (5.47)	3 (5.45)	3 (6.81)	14 (5.71)		
Unemployed	14 (9.58)	9 (16.36)	3 (6.81)	26 (10.61)		
Student	31 (21.23)	10 (18.18)	11 (25.00)	52 (21.22)		
Other	8 (5.47)	1 (1.81)	3 (6.81)	12 (4.89)		
SOCIO-PROFESSIONAL CATEGORY					16.12	0.09
Craftsmen	9 (6.16)	5 (9.09)	3 (6.81)	17 (6.93)		
Executives	50 (34.24)	13 (23.63)	14 (31.81)	77 (31.42)		
Intermediate prof.	13 (8.90)	3 (5.45)	5 (11.36)	21 (8.57)		
Employees	35 (23.97)	16 (29.09)	3 (6.81)	54 (22.04)		
Workmen	2 (1.36)	3 (5.45)	4 (9.09)	9 (3.67)		
Other	37 (25.34)	15 (27.27)	15 (34.09)	67 (27.34)		
FAMILY SITUATION					2.59	0.62
Single	80 (54.79)	35 (63.63)	28 (63.63)	143 (58.36)		
Couple	63 (43.15)	19 (34.54)	16 (36.36)	98 (40.00)		
Divorced	3 (2.05)	1 (1.81)	0 (0.00)	4 (1.63)		
CHILDREN	36 (24.65)	13 (23.63)	10 (22.72)	59 (24.08)	0.07	0.96

NPG = non-pathological gamblers; PbG = problem gamblers; PG = pathological gamblers; Other: includes students and retired people.

Table 2. Gambling practice (live poker players)

	NPG-L (n = 34) Mean (SD)	PbG-L (n = 18) Mean (SD)	PG-L (n = 13) Mean (SD)	Total (n = 65) Mean (SD)	ANOVA F	p
SOGS	0.61 (0.73)	3.38 (0.50)	7.92 (2.84)	2.84 (3.13)	132.400	0.0001
Sessions/week	3.17 (2.54)	4.38 (4.44)	3.69 (2.09)	3.61 (3.11)	0.89	0.41
Hours/session	3.47 (1.86)	4.00 (1.84)	4.53 (1.71)	3.83 (1.85)	1.70	0.18
Beginning age	25 (7.06)	20.83 (4.07)	22.38 (7.73)	23.32 (6.69)	2.55	0.08
Duration of regular practice (in months)	46.11 (25.35)	34.50 (14.88)	34.38 (14.54)	40.55 (21.55)	2.48	0.09
Maximum amount bet (in euros)	721.11 (1875.34)	700 (1227.65)	2142.30 (3530.1)	999.50 (2209.09)	2.26	0.11
Maximum amount won (in euros)	2881.41 (5899.5)	6709 (13616.6)	6652.30 (7593.2)	4695.13 (9037.3)	1.45	0.24
	N (%)	N (%)	N (%)	N (%)	Chi	p
GOALS					0.72	0.99
Financial	23 (67.64)	15 (83.33)	13 (100)	51 (78.46)		
Leisure	27 (79.41)	15 (83.33)	11 (84.61)	53 (81.53)		
Social	12 (35.29)	6 (33.33)	5 (38.46)	23 (35.38)		
TYPE OF GAME					4.49	0.10
Tournament	21 (61.76)	16 (88.88)	10 (76.92)	47 (72.30)		
Cash game	13 (38.23)	2 (11.11)	3 (23.07)	18 (27.69)		
AVERAGE BUY-IN					8.51	0.74
Less than 5 €	9 (26.46)	2 (11.11)	0 (0)	11 (16.91)		
5 to 25 €	14 (41.16)	11 (56.10)	4 (30.76)	29 (42.78)		
25 to 50 €	3 (8.82)	1 (5.55)	3 (23.07)	7 (10.76)		
50 to 100 €	4 (11.76)	1 (5.55)	2 (15.38)	7 (10.76)		
More than 100 €	4 (11.76)	3 (16.66)	4 (30.76)	11 (16.92)		
GAMBLING VENUES					6.49	0.16
Casinos	18 (52.94)	11 (61.11)	12 (92.30)	41 (63.07)		
Private games	28 (82.35)	13 (72.22)	9 (69.23)	50 (76.92)		
Associations	23 (67.64)	4 (22.22)	5 (38.46)	32 (49.23)		

NPG-L = live non-pathological gamblers; PbG-L = live problem gamblers; PG-L = live pathological gamblers.



Table 3. Gambling practice (online poker players)

	NPG-O (n = 112)	PbG-O (n = 37)	PG-O (n = 31)	Total (n = 180)	ANOVA	
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	F	p
SOGS	1.04 (0.75)	3.45 (0.50)	6.38 (1.56)	2.46 (2.22)	450.29	0.001
Session/week	4.88 (2.05)	4.51 (1.72)	5.38 (1.62)	4.89 (1.93)	1.74	0.17
Hours/session	2.80 (1.64)	3.67 (1.81)	3.35 (1.68)	3.07 (1.71)	4.21	0.01
Beginning age	25.10 (7.80)	25.22 (8.24)	23.61 (6.82)	24.87 (7.71)	0.49	0.61
Duration of regular practice (in months)	37.15 (19.56)	33.41 (14.49)	38.48 (17.13)	36.61 (18.21)	0.78	0.45
Maximum amount bet (in euros)	257.34 (366.91)	505.30 (1422.8)	811.77 (1626.7)	403.79 (989.20)	4.20	0.01
Maximum amount won (in euros)	2327.2 (5143.4)	2556.9 (4243.9)	3233.2 (4272.5)	2530.4 (4816.4)	0.42	0.65
	N (%)	N (%)	N (%)	N (%)	Chi	p
MULTITABLING					18.85	0.004
Never	6 (5.35)	0 (0)	2 (6.45)	8 (4.44)		
Sometimes	17 (15.17)	6 (16.21)	5 (16.12)	28 (15.55)		
Often	12 (10.71)	13 (35.13)	11 (35.48)	36 (20)		
Always	77 (68.75)	18 (48.64)	13 (41.93)	108 (60)		
GOALS					27.16	0.0001
Financial	97 (87.38)	34 (91.89)	28 (90.32)	160 (88.88)		
Leisure	88 (78.57)	30 (81.08)	17 (54.83)	135 (75)		
Social	4 (10.81)	13 (11.60)	6 (19.35)	23 (12.77)		
TYPE OF GAME					3.35	0.18
Tournament	51 (45.53)	23 (62.16)	17 (54.83)	91 (50.55)		
Cash game	61 (54.46)	14 (37.83)	14 (45.16)	89 (49.44)		
AVERAGE BUY-IN					8.51	0.74
Less than 5 €	27 (24.1)	10 (27.02)	5 (16.12)	42 (23.32)		
5 to 25 €	41 (36.60)	14 (37.82)	12 (38.70)	67 (37.22)		
25 to 50 €	13 (11.60)	6 (16.21)	5 (16.12)	24 (13.33)		
50 to 100 €	16 (14.28)	6 (16.21)	5 (16.12)	27 (15)		
More than 100 €	15 (13.39)	1 (2.70)	4 (12.90)	20 (11.11)		

NPG-O = online non-pathological gamblers; PbG-O = online problem gamblers; PG-O = online pathological gamblers.

of gambling sessions: PbGs and PGs played significantly longer sessions than NPGs ( $p < 0.01$ ). The three groups also differed significantly in terms of the maximum amount bet [ $F(2, 177) = 3.34$ ;  $effect\ size = 0.21$ ;  $p = 0.001$ ]: pathological gamblers reported higher bets ( $M = 811$  euros;  $SD = 1626$ ) than non-pathological gamblers ( $M = 257$  euros;  $SD = 366$ ).

The motivations for playing poker appeared to differ across the three groups [ $\chi^2(4) = 27.16$ ;  $p = 0.001$ ]: financial motivation was homogeneous across groups (88% of the participants), but leisure was an aim significantly more frequently reported by NPGs (78%) and PbGs (81%) than by PGs (54%).

Multitabling (i.e. playing on several poker tables at the same time) significantly distinguished all groups [ $\chi^2(6) = 18.85$ ;  $p = 0.004$ ]: 68% of NPGs were “always” doing it (41% of PGs); whereas most PGs reported doing it “often” (35%). Interestingly, only 4.44% of the sample reported always playing one table at a time. Only 11% of online players (including 12% of PGs) reported an average buy-in greater than 100 €.

Table 4 presents a comparison of the scores presented in Tables 2 and 3 between the gambling practices of live and online gamblers using Student’s  $t$  test.

In the total sample, live gamblers reported longer gambling sessions ( $t = 2.96$ ;  $d = 0.18$ ;  $p = 0.0001$ ), higher amounts bet ( $t = 2.90$ ;  $d = 0.18$ ;  $p = 0.003$ ) and higher

amounts won ( $t = 2.40$ ;  $d = 0.15$ ;  $p = 0.01$ ). However, online gamblers reported more frequent gambling sessions ( $t = 3.82$ ;  $d = 0.23$ ;  $p = 0.0001$ ).

Online PGs played more often than live PGs ( $t = 2.89$ ;  $d = 0.40$ ;  $p = 0.006$ ), but their gambling sessions were shorter ( $t = 2.11$ ;  $d = 0.30$ ;  $p = 0.04$ ).

The reasons for playing poker also appeared to differ significantly between live and online players; however, this difference was only significant in the total sample and in the NPG group. Financial motivation was more often reported by online players (88%) than live players (78%), whereas social aspects were more prevalent among live gamblers (35%) than online gamblers (11%).

#### Impulsive sensation seeking scores

In the total sample, PGs scored higher on the ImpSS scale (PG: Mean = 9.98;  $SD = 4.42$ ; PbG: Mean = 8.11;  $SD = 3.85$ ;  $t = 2.25$ ,  $p = 0.03$ ) and Imp subscale (PG: Mean = 3.39;  $SD = 2.34$ ; PbG: Mean = 2.38;  $SD = 1.87$ ;  $t = 2.37$ ,  $p = 0.02$ ) than PbGs and NPGs (NPG: Mean = 7.08;  $SD = 3.99$ ;  $t = 4.12$ ,  $p = 0.001$  for ImpSS; NPG: Mean = 1.68;  $SD = 1.69$ ;  $t = 5.34$ ,  $p = 0.001$  for Imp). On the other hand, there was no significant difference in the SS subscale between the three groups. SOGS was significantly correlated to Imp ( $r = 0.35$ ,  $p < 0.05$ ) but not with SS ( $r = 0.14$ ,  $p > 0.05$ ).

Table 4. Comparison of the gambling practices of live and online NPGs, PbGs and PGs

	NPG (n = 146)			PbG (n = 55)			PG (n = 44)			Total (n = 245)		
	Online gamblers Mean (SD)	Live gamblers Mean (SD)	d	Online gamblers Mean (SD)	Live gamblers Mean (SD)	d	Online gamblers Mean (SD)	Live gamblers Mean (SD)	d	Online gamblers Mean (SD)	Live gamblers Mean (SD)	d
Session/week	4.88 (2.05)	3.17 (2.54)	0.0001	4.51 (1.72)	4.38 (4.44)	0.01	5.38 (1.62)	3.69 (2.09)	0.40	4.89 (1.93)	3.61 (3.11)	0.0001
Hours/ sessions	2.80 (1.64)	3.47 (1.86)	0.04	3.67 (1.81)	4.00 (1.84)	0.16	3.35 (1.68)	4.53 (1.71)	0.30	3.07 (1.71)	3.83 (1.85)	0.003
Beginning age	25.10 (7.80)	25 (7.06)	0.94	25.22 (8.24)	20.83 (4.07)	0.04	23.61 (6.82)	22.38 (7.73)	0.07	24.87 (7.71)	23.32 (6.69)	0.15
Duration of regular practice (in months)	37.15 (19.56)	46.11 (25.35)	0.03	33.41 (14.49)	34.50 (14.88)	0.17	38.48 (17.13)	34.38 (14.54)	0.11	36.61 (18.21)	40.55 (21.55)	0.15
Maximum amount betted (in euros)	257.34 (366.91)	721.1 (1875.3)	0.01	505.3 (1422.8)	700 (1227.65)	0.20	811.7 (1626.7)	2142.3 (3530.1)	0.06	403.7 (989.2)	999.5 (2209)	0.003
Maximum amount won (in euros)	2327.2 (5143.4)	2881.4 (5899.5)	0.59	2556.9 (4243.9)	6709 (13616)	0.04	3233.2 (4272.5)	6652.3 (7593.2)	0.22	2530.4 (4816)	4695.5 (9037)	0.01
Goals	Chi 25.37	p 0.001		Chi 0.83	p 0.84		Chi 0.95	p 0.81		Chi 14.40	p 0.002	
Average buy-in	Chi 0.73	p 0.99		Chi 9.06	p 0.17		Chi 5.31	p 0.50		Chi 3.98	p 0.67	

NPG = non-pathological gamblers (live vs. online players); PbG = problem gamblers (live vs. online players); PG = pathological gamblers (live vs. online players); Total = live vs. online players; d = effect size (Cohen's d).

Table 5. ImpSS scores and comparisons for online and live gamblers

	NPG (n = 146)			PbG (n = 55)			PG (n = 44)			ANOVA		
	Online (n = 112)	Live (n = 34)		Live (n = 18)	Online (n = 37)		Live (n = 13)	Online (n = 31)		F	p	
	Mean (SD)	Mean (SD)	t	Mean (SD)	Mean (SD)	t	Mean (SD)	Mean (SD)	t			
ImpSS	7.11 (3.46)	7.06 (4.15)	0.07	9.83 (3.60)	7.32 (3.68)	2.42	8.38 (3.90)	10.09 (4.45)	-0.27	4.59	0.79	0.001
Imp	1.88 (1.47)	1.61 (1.75)	0.8	2.88 (2.22)	2.18 (1.99)	1.42	2.46 (1.83)	3.38 (2.27)	0.003	6.41	0.99	0.001
SS	5.23 (3.07)	5.44 (3.01)	-0.4	6.94 (2.79)	5.16 (2.66)	2.32	5.92 (2.86)	6.70 (2.96)	-0.44	2.13	0.66	0.06

NPG = non-pathological gamblers; PbG = problem gamblers; PG = pathological gamblers; ImpSS = impulsive sensation seeking; Imp = impulsivity; SS = sensation seeking.

Table 5 presents the scores and comparisons of online and live gamblers, based on the intensity of gambling practice. When online and live gamblers were compared according to the intensity of their gambling practice, there was no significant difference in ImpSS or in Imp or SS subscales, except for PbGs. In fact, live PbGs scored higher in ImpSS (Live gamblers: Mean = 9.83; SD = 3.6; Online gamblers: Mean = 7.32; SD = 3.68; t = 2.42; p = 0.02) and in SS (Live gamblers: Mean = 6.94; SD = 2.79; Online gamblers: Mean = 5.16; SD = 2.66; t = 2.32; p = 0.02) than online PbGs.

## DISCUSSION

The present study aimed to assess sociodemographic data, gambling practice and impulsive sensation seeking among regular poker players and to compare live and online gamblers, with regard to the intensity of gambling practice. In fact, the literature underlines the special features of online gamblers, especially in terms of sociodemographic data (Gainsbury et al., 2012; Ladd & Petry, 2002). However, in our sample, unlike Kairouz et al.'s (2012), which investigated gamblers of different types of game, we did not find significant differences between live and online gamblers: the medium used to play did not seem to be linked to particular sociodemographic characteristics. In addition, the intensity of gambling practice did not distinguish participants in terms of sociodemographic data. However, the fact that poker players tend to play both online and live poker (although we only kept players in our sample who did not report both types of playing on a regular basis) may partially explain this lack of differences. The main sociodemographic characteristics of poker players in our sample were male, with a mean age of 29 years, executives or students, mostly single and working full-time. Thus, in our study, online and live poker players appeared to have a different profile from that of live PGs described in the literature (Costes, Pousset, Eroukmanoff, & Le Nezet, 2011). In contrast, it was relatively close to the profile of online gamblers described in the literature (Gainsbury et al., 2012; Griffiths & Barnes, 2008). However, in our sample, this specific profile cannot be imputed solely to the use of Internet, as live gamblers displayed the same sociodemographic characteristics. We hypothesized that fondness for poker could be another explanation for these characteristics. Indeed, poker, being a game including a real skill component and also benefiting from high media exposure, may attract a specific population of gamblers.

Furthermore, our data underlined the involvement of poker players, regardless of their intensity of gambling, in poker playing: in the total sample, participants played an average of 4.25 times a week, for a mean duration of 3.45 hours per session. Among live gamblers, we did not find significant differences in terms of gambling practice between PGs, PbGs and NPGs, although PGs tended to play longer and to bet higher amounts than NPGs. A majority of PGs played in casinos, favoring financial reward, whereas NPGs tended to report more playing in private games (i.e. with friends) or in associations, rather putting forward the social benefits. Among online players, we found that PGs

played more often than PbGs and NPGs. Furthermore, PGs bet significantly higher amounts than NPGs. Unlike NPGs and PbGs, PGs seemed to consider poker more a way of winning money rather than a leisure activity.

Online and live poker players displayed some differences in terms of gambling practice. In fact, online gamblers reported playing significantly more often than live gamblers, who displayed significantly longer gambling sessions. This can be partly explained by the special features of live and online gambling: online gambling is characterized by an easy access, 24/7, and a high game speed, whereas live gambling is less easy to access, as the gambler has to move physically from his house to attend gambling venues (which are also, unlike online gambling, subject to temporal restrictions, i.e. opening hours). Furthermore, live gamblers reported betting significantly higher average amounts than online gamblers, which can also be, at least partially, explained by the media. In fact, online gambling offers the possibility of playing for small amounts, while providing a perception of non-negligible potential wins (Wood, Williams et al., 2007). The financial aspect seems especially important for online players: they were significantly more likely than live players to play for financial benefits, whereas live players reported more frequently the social benefits. These results are consistent with data from a former qualitative study showing that live poker was preferred for its social aspect, environment and sensory stimulations (Barrault et al., 2014).

On the basis of the idea that live poker provides more sensory stimulation, we hypothesized that live poker players would be higher sensation seekers than online gamblers. Our results did not totally confirm this hypothesis: online PbGs had significantly lower SS scores than live PbGs, but there were no significant differences in the PG and NPG groups. Overall, sensation seeking appeared to be high across all groups, suggesting that it is a dimension common to all poker players. This dimension may thus condition interest in poker. This result is consistent with those of Petry (2003), who found that card gamblers were high sensation seekers, gambling to experience strong sensations and arousal. In contrast, impulsivity significantly distinguished PGs, PbGs and NPGs, with no significant differences between live and online players. The intensity of gambling practice was significantly correlated to impulsivity, but not to sensation seeking. Hence, impulsivity seems to play an important role in the development and maintenance of pathological gambling, as underlined by the literature (Dussault et al., 2011; Petry, 2001; Steel & Blaszczynski, 1998; Vitaro et al., 1999). It is also a predictor for pathological gambling among poker players (Barrault & Varescon, 2013a; Hopley & Nicki, 2010). Both impulsivity and sensation seeking therefore seem to be involved in poker practice but playing different roles. Sensation seeking may condition interest for this type of gambling, providing strong sensations and feelings. This idea is strengthened by qualitative data, suggesting that tension and arousal may be generated by the poker situation itself and actively sought by poker players, who report playing for strong sensations and feelings, regardless of the intensity of gambling (Barrault et al., 2014). On the other hand, impulsivity, leading the gambler to make quick, uninformed

and maladaptive decisions, seems to be involved in the development and maintenance of pathological gambling.

To our knowledge, our study is the first to compare live and online poker players, in terms of gambling practice, personality dimensions and sociodemographic data. However, there are several limitations to the interpretation and generalization of the results. First, participants were self-selected and may not be totally representative of the poker player population. However, we tried to constitute a sample as representative as possible, in particular by recruiting our participants in ecological settings (Internet forums and gambling venues). To screen gambling problems, we used the SOGS (Lesieur & Blume, 1987), which is the most used screening tool in research but is also known to foster false positives in a general population (Stinchfield, 2002). PGs in this study should therefore be considered as probable PGs.

Despite these limitations, this study provides interesting results and research perspectives. Our results showed that poker players had a specific sociodemographic profile, regardless of whether they were live or online gamblers. Surprisingly, there were only a few differences in poker practice between live and online players, which can be partially explained by the medium chosen to play. Investigating motivations to engage in live or online gambling seems to be a relevant axis of research. Moreover, further studies should investigate the links between impulsive sensation seeking and normal and pathological poker playing more closely, for instance by assessing impulsivity and sensation seeking as multifactorial dimensions. Impulsivity could be assessed with the Impulsive Behavior Scale (UPPS-P), which measures five impulsivity components: negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking (Billieux et al., 2012). This would provide a better understanding of the dimension of impulsivity among poker players. Besides impulsivity, several factors seem to be involved in pathological poker playing, especially cognitive distortions (Barrault & Varescon, 2013b) and negative mood states (Barrault & Varescon, 2013b; Wood, Griffiths et al., 2007). Further studies could investigate the respective weight of these factors in pathological gambling among poker players.

## CONCLUSIONS

Our data underline the role of impulsivity and sensation seeking in normal and pathological poker practice and provide a sociodemographic profile of poker players. At-risk populations (high sensation seekers and impulsive people, with matching sociodemographic profiles) could be specifically targeted for preventive actions. Treatment for pathological poker players could also take into account the role of impulsivity and sensation seeking.

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*Authors' contribution:* SB and IV both made the study concept and design. SB was in charge of the gathering,



analysis (including statistical analysis) and interpretation of the data. IV supervised the study. Both authors had full access to all data in the study and take responsibility for the integrity of the data and the accuracy of data analysis.

*Conflict of interest:* The authors declare no conflict of interest.

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