SOME NEUROPSYCHOLOGICAL PROFILES AND PERSONALITY TRAITS OF UNDERGRADUATE REGULAR ONLINE FOOTBALL GAMBLERS (A NEW ONLINE GAMBLING GAME) IN NIGERIA

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ABSTRACT: *Objectives: Online football gambling is a relatively new game in Nigeria. Like other gambling games, some psychological profiles either propel or sustain the behaviour. We tested some neuropsychological profiles and personality traits that distinguish the regular online football gambles from healthy control group (Non-gamblers). Method: Using a between group design, we tested 140 (60: online gamblers; 80: Healthy controls) university undergraduate students between the ages of 18 – 26 years on some neuropsychological domains (attention, inhibition and executive function) and personality traits. The neuropsychological tasks used were the Series Addition Task (a modified version of Paced Auditory Serial Addition Task (PASAT), Stroop-Word Colour test and Trail Making Test (TMT) A & B. The personality traits were assessed using the Big Five Personality Inventory. Result: The findings showed significant differences between the online football gamblers and the healthy controls on four personality traits: agreeableness, conscientiousness, neuroticism and openness to experience, with the online football gamblers performing better than the healthy controls. However, in the attention tasks, the healthy controls made less significant errors on forward addition and backward subtraction tasks but took more time to complete the backward counting task. On the other hand, the online football gamblers performed better on time taken to complete the stroop congruence task and errors made on stroop incongruence. Similarly, the online football gamblers took less time to complete the TMT B and made less errors on TMT A. Conclusion: University undergraduate regular online football gamblers demonstrate stronger personality traits of ambition and gregariousness, and as well show promising capacity on tasks of executive function but however show deficits on tasks of divided and sustained attention.*

KEYWORDS: Neuropsychological Profiles, Personality Traits, Online Football Gamblers

INTRODUCTION

Gambling behaviour especially pathological gambling has been associated with neuropsychological dysfunctions and impulsive personality traits. Pathological gambling is characterized by a persisting maladaptive and recurrent behaviour with severe social and psychological consequences (Kapsomenakis, Simos, Kostantakpoulos & Kasselimis, 2018). Kapsomenakis et al (2018) investigated impairments in executive functions and working memory and personality traits in a sample of Greek gamblers. In their findings, gamblers as a group displayed significantly lower scores in indices of inhibition, decision making and self-reported emotional awareness but scored higher on impulsivity/sensation seeking personality traits. However, gamblers scored similarly or significantly higher on measures of verbal and

visuo-spatial working memory, cognitive flexibility, processing speed, verbal fluency and sustained attention. Thus, although gamblers do present with specific cognitive deficits, there is no evidence for a generalized executive impairment. Essentially the Kapsomenakis et al (2018) study failed to show clearly whether their participants were ordinary gamblers or pathological gamblers (PGs) based on recognized criteria. Relatively Kertzman, Vainder, Aizer, Kotler and Danmon (2017) compared different measures of behaviour inhibition using 3 different tasks. In their findings, augmented total inference response time in the stroop task, high number of commission errors in the GO/NO-go task and total number of errors in the Matching Familiar Figures Test (MFFT) were able to discriminate PGs from health controls (HCs), while slow response time in the GO/NO-go task has borderline ability. On the other hand, the number errors in the incongruent condition, total interference in terms of error rate, number of omissions in the GO/NO-go task, and first response time in the MFFT could not differentiate between the PGs and HCs. Their findings suggest that not all inhibition measures are relevant to pathological gambling and that PGs do not express rash impulsive behaviour such as quick answer without thinking. Overall mixed evidence trails the literature on the strengths and weakness of gamblers as it relates neuropsychological functioning.

The present study investigated some neuropsychological profiles of online football gamblers in Anambra state, Nigeria. The online football gambling is relatively new to Nigerians and appears to have become the most patronized gambling game in the country within the shortest time. Almost all the youths and mid adults have access and can afford gambling game. This accessibility and affordability have increased the population of people that patronise the game. As with other gambling activities, there are psychological and neuropsychological consequences of such gambling behaviour.

However, to the authors best of knowledge, no study in Nigeria has examined neuropsychological and personality traits of the online football gamblers. Among the problems that needed investigation are the possible neuropsychological and personality discriminators of the online football gamblers from the Healthy Controls and possibly other gambling games as well as the level of addiction or pathological gambling found among this group of gamblers and their social and economic consequences. In line with this, our study aims at comparing differences between online football gamblers and healthy controls on some indices of neuropsychological behaviours including impulsive inhibition, processing speed and attention span. Equally we investigated differences on Big Five Personality traits between the football gamblers and healthy controls. It is our hypotheses that online football gamblers will differ significantly from healthy control on neuropsychological measures of inhibition and personality traits of neuroticism, while no significant differences will be found on other domains of neuropsychological and personality measures.

METHODS

Participants

One hundred and forty (140) young adults between the ages of 18 – 26 were recruited for the study. The sample participants were drawn from the undergraduate student population of Chukwuemeka Odumegwu Ojukwu University, Igbariam Campus. The Gambling Group (GG) was students that regularly patronize the online football gambling centers located

around the campus while the Control Group (CG) was students who do not gamble matched on age and gender against the gambling group. Table one shows the demographic variables of the participants. The table demography shows the two groups did not differ significantly on age and gender.

Table 1: Demographic Variable of Participants

Age					Gender			
	N	Mean age	SD age	t	Males	X^2	Females	X^2
GG	60	23.05	2.00		52		08	
				0.44*		3.84**		0.29*
CG	80	23.20	1.96		74		06	

Note: * shows significance at P > 0.66

    ** shows significance at P > 0.10

Instrument

Big Five Personality Inventory (BFI) was used to assess the personality traits of the participants. The BFI is a personality instrument that assesses underlying personality traits based on lexical trait theories and has 5 dimensions as developed by John, Donahue and Kentle (1991). The inventory has been adapted for use in Nigeria (Umeh, 2004) and has been widely used as assessment tools in Nigeria. It measures five domains of personality traits: extraversion, agreeableness, conscientiousness, neuroticism and openness to experience.

On the other hand, neuropsychological assessment of attention and perceptual motor speed was also administered to the participants. A remodified version of Paced Auditory Serial Addition Task (PASAT) devised by Gronwall and Sampson (1974) was administered to both online gamblers and healthy control participants. The version of the modified PASAT involved 4 tasks: The first was to ask the participants to list odd numbers from 1 – 30; the second task was digit addition task forward. Here the participants were asked to add "3" to initial number 3 and keep adding 3 to successive numbers until 42. The same was done with number 5. Participants were asked to add "5" to initial number "3" and keep adding 5 to successive numbers until 43. The third task was digit count (backwards) where participants were asked to count from 10 back to 1 and also form 20 back to 1 as fast as possible. The fourth task was digit subtraction (backwards) where participants were asked to count from 10 back to 1 subtracting "2" from every successive score, and also to count from 20 back to 1 subtracting 3 from every successive score. The tasks were time and error adjusted.

The Stroop Word Colour test was also administered to the participants. The stroop instrument assessed stroop congruence, stroop incongruence and stoop interference. We assessed the time taken to respond as well as the errors made on the three tasks. Equally,the trail making test was also administered including Trail Making Tests A and B (TMT: A & B). The time taken and errors made on the tasks were also recorded.

Procedures

The research assistants recruited for the study (3 masters students) went to online football gambling centers around the campus to identify students that involve in online football gambling. An individualized approach was used whereby the research assistant approaches an

individual, introduces himself and purpose of study and solicits the individual's willingness to participate in the study. The individual was given a form that assesses his/her attendance to the gambling centre. Persons that attend average of 4 days in a week were finally recruited for the study. The control group was undergraduate students in the faculty of Social Sciences and Management Sciences of the same university who indicated interest and responded positively to question that they have not gambled and are not gamblers. The control group was matched on age and gender with the online football gamblers. The reason for selecting students in the faculties of Social amd Management Sciences as the control group was that the campus was predominantly students of those faculties and the over 90% of our gambling group were from this two faculties.

Design/Statistics

Cross sectional between group design was used in the study. This involves assessing a cross section of online football gamblers on some personality and neuropsychological measures and comparing them with their counterparts who do not gamble. The data was analyzed using the multiple analysis of covariate (MANCOVA) whereby gender was placed as a covariate. Other descriptive statistical analysis was also computed including the mean, standard deviation and standard error.

RESULTS

The analysis started by testing between group differences of online football gamblers and the control group on trait personalities. The findings showed significant differences on 4 personality traits; Agreeableness $F_{(1, 140)} = 54.59$; Conscientiousness $F_{(1,140)} = 40.07$; Neuroticism $F_{(1,140)} = 14.92$; Openness to experience $F_{(1,140)} = 3.41$ while no significant difference was found on Extraversion $F_{(1,140)} = 1.41$. The mean comparisons showed that online football gamblers had high mean scores on 3 personality traits: agreeableness, conscientiousness, openness to experience, but scored significantly low on neuroticism personality trait.

Table 2: Means and Pairwise Comparisons of Personality Traits

Dependent Variable	Group	Mean	Mean Difference
Extraversion	Online Gamblers	24.48	-0.72
	Normals	25.20	
Agreeableness	Online Gamblers	35.85	7.46*
	Normals	28.39	
Conscientiousness	Online Gamblers	33.91	6.43*
	Normals	27.48	
Neuroticism	Online Gamblers	20.99	-3.57*
	Normals	24.56	
Openness to experience	Online Gamblers	35.94	4.85*
	Normals	31.09	

Notes: * = Shows the mean difference is significant at 0.05 level. Conversely the effect size ranged from 0.01 to 0.29 with trait personalities of agreeableness = 0.29; Conscientiousness =

0.23; Openness to experience = -0.19; Neuroticism= 0.10 and extraversion = 0.01. When gender was included as a covariate, significant gender differences were found in agreeableness F (1,147) =4.58 and Conscientiousness F (1,147) =15.36 with effect size of 0.03 and 0.10 respectively. Table 2 shows the descriptive statistics of gender and Group on trait personalities.

Table 3: Descriptive Statistics of Personality and gender

Dependent variable	Group	Gender	Mean	SN	N
Extraversion	Online Gamblers	Males	24.33	3.82	52
		Females	25.63	2.45	8
		Total	24.50	3.68	60
	Control Group	Males	25.23	3.43	74
		Females	24.83	3.13	6
		Total	25.19	3.39	80
	Total	Males	24.85	3.61	126
		Females	25.29	2.67	14
		Total	24.89	3.52	140
Agreeableness	Online Gamblers	Males	35.33	5.97	52
		Females	40.13	4.16	8
		Total	35.97	5.96	60
	Control Group	Males	28.15	5.99	74
		Females	30.17	5.71	6
		Total	28.30	5.96	80
	Total	Males	31.11	6.93	126
		Females	35.86	6.93	14
		Total	31.59	7.05	140
Conscientiousness	Online Gamblers	Males	33.10	5.84	52
		Females	40.88	2.80	8
		Total	34.13	6.17	60
	Control Group	Males	26.93	6.27	74
		Females	32.00	5.06	6
		Total	27.31	6.31	8
	Total	Males	29.48	6.79	126
		Females	37.07	5.90	14
		Total	30.24	7.07	140
Neuroticism	Online Gamblers	Males	20.87	5.63	52
		Females	22.00	5.50	8
		Total	21.02	5.58	60
	Control Group	Males	24.53	5.04	74
		Females	24.67	7.34	6
		Total	24.54	5.19	80
	Total	Males	23.02	5.57	126
		Females	23.14	6.24	14
		Total	23.03	5.62	140
Openness to experience	Online Gamblers	Males	35.54	4.63	52
		Females	39.00	4.11	8
		Total	36.00	4.69	60

Control Group	Males	31.04	5.28	74	
	Females	31.00	6.39	6	
	Total	31.04	5.32	80	
Total	Males	32.90	5.47	126	
	Females	35.57	6.45	14	
	Total	33.16	5.61	140	

On the other hand, on the attention tasks (see instrument section) performed by the online football gamblers and control group, the findings showed significant differences between the groups on the time taken to complete the backward counting task, $F(1,140) = 17.19$, the number of errors made on forward addition $F(1,140) = 17.88$ and number of errors on backward subtraction task $F(1,140) = 4.08$ all at $P \leq 0.05$ level of testing. However, no significant differences were found on gender as covariate except on backward counting $F(1,140) = 5.16$ at $P \leq 0.05$ level of testing. Table 3 and 4 show the mean and mean differences of the attention tasks.

Table 4: Mean Estimates of Time taken to Complete Attention Tasks

Dependent variable	Group	Mean	Std Error
List odd numbers	Online Gamblers	25.28	1.44
	Control Group	24.01	1.25
Forward Addition	Online Gamblers	50.58	1.77
	Control Group	47.01	1.53
Backward Counting	Online Gamblers	11.94	0.58
	Control Group	15.29	0.50
Backward Subtraction	Online Gamblers	22.18	1.16
	Normals	23.84	1.00

Table 5: Mean Estimates of Errors made During the Tasks

Dependent variable	Group	Mean	Std Error
List odd numbers	Online Gamblers	0.89	0.15
	Normals	0.73	0.13
Forward Addition	Online Gamblers	2.68	0.21
	Normals	1.56	0.18
Backward Counting	Online Gamblers	0.53	0.12
	Normals	0.56	0.10
Backward Subtraction	Online Gamblers	1.59	0.15
	Normals	1.16	0.13

Table 6: Mean Estimates of Time Taken to Complete Attention Tasks between Gender

Dependent variable	Group	Mean	Std Error
List odd numbers	Males	24.78	1.01
	Females	24.56	3.00
Forward Addition	Males	48.78	1.24
	Females	49.44	3.71
Backward Counting	Males	13.38	0.40
	Females	16.25	1.20
Backward Subtraction	Males	23.14	0.81
	Females	22.75	2.42

Data from Stroop Word Colour test were further analysed between the online football gamblers and control group The findings show no significant difference on time taken and errors made on the Stroop Word Colour tasks (stroop congruence, stroop incongruence and stroop interference tasks), except on time taken to complete the stroop congruence, $F(1, 140) = 27.88$ and error made on Stroop interference $F(1,140) = 6.71$ all at $P \leq 0.05$. Gender as a covariate shows no significant difference. Table 7 show the means and standard errors measurement on the tasks.

Table 7: Means and Standard Errors on Time Taken to Complete the Stroop Word Colour Tasks.

Dependent variable	Group	Mean	Standard Error	Grand mean
Stroop congruence	Online Gamblers	3.28	0.24	
	Normals	4.98	0.21	4.13
Stroop incongruence	Online Gamblers	6.41	0.34	
	Normals	6.75	0.30	6.57
Stroop interference	Online Gamblers	6.75	0.48	
	Normals	7.60	0.42	7.18

Table 8: Mean and Standard Error on Errors made on Stroop Word Colour Tasks.

Dependent variable	Group	Mean	Standard Error	Grand mean
Stroop congruence	Online Gamblers	0.10	0.05	
	Normals	0.16	0.04	0.13
Stroop incongruence	Online Gamblers	0.82	0.12	
	Normals	0.87	0.11	0.85
Stroop interference	Online Gamblers	0.73	0.13	
	Normals	1.17	0.11	0.95

Table 8 above shows the mean and standard error of measurement on errors made on Stroop Word Colour task. The Control group made more errors though not significant at 0.05 level of testing except on stroop interference errors.

The data on trial Making Tests A and B show significant differences between the groups on time taken to complete TMT B $F(1, 140) = 3.87$ and errors made on TMT A $F(1, 140) = 6.67$. The Control group took more time to complete the TMT B and made more errors than the online football gamblers on TMT A.

Table 9: Mean and Standard Error on Time Taken to Complete TMT A and B

Dependent variable	Group	Mean	Standard Error	Grand mean
TMT A	Online Gamblers	54.15	2.71	
	Normals	55.80	2.34	54.98
TMT B	Online Gamblers	92.59	4.94	
	Normals	105.49	4.23	99.04

Table 10: Mean and Standard Error of Measurement on the errors made on TMT A and B

Dependent variable	Group	Mean	Standard Error	Grand mean
TMT A	Online Gamblers	0.10	0.09	
	Normals	0.42	0.08	0.26
TMT B	Online Gamblers	0.66	0.15	
	Normals	0.95	0.13	0.80

DISCUSSION

Our findings show significant differences between online football gamblers and control group on 4 measures of personality traits. Online football gamblers scored higher than the control group on personality traits of agreeableness, conscientiousness and openness to experience but scored lower on measure of neuroticism (negative emotionality). The four personality traits were among the 5 measures of personality traits captured under the Big Five typologies (BFI). The BFI has been argued to underlie many personality traits that have both biological and environmental causalties. The present study shows that the online gamblers had better healthy personality traits when compared with the non-gamblers. Mixed findings have trailed the literatures on personality patterns dominant among gamblers.

The diversity of gambling activities poses a challenge when trying to understand the relation between personality and gambling (Savage, Shitske & Martin, 2014) and therefore surprising that a consensus has not yet been reached about the personality traits that are related to the propensity to gamble (Savage et al, 2014). Experts have raised concerns about the common practice of lumping together involvement in different activities in studies of the correlates of gambling (Conventry & Brown, 1993; Dickerson, 1993, Zukerson, 2005) and have suggested that this practice may be contributing to the contradictory findings that are frequently found in the literature (Griffiths, 2013). Our present findings were in line with that of Savage et al (2014) that classified gambling into 4 classes using the Latent Class Analysis (LCA). In their LCA, 4 classes were found: 1: Extensive gambling class (Class 1). 2: Non-strategic gambling class (Class 2); 3: Strategic gambling class (Class 3); 4: the lotter/scratch card class (Class 4);

and 5: the low gambling class (Class 5). Our participants fell within the strategic gambling class (class 3) which Savage et al (2014) describes as gamblers exclusive on horse/dog races, table games, sports betting, cards and betting on games of skills. Savage et al (2014) showed that strategic gambling class (Class 3) had a profile of high positive emotionality (e.g. interpersonal effectiveness and ambitiousness) high aggression, low constraint, low magical ideation and high sensation seeking. The findings from our study show that online football gamblers had high agreeableness and conscientiousness personality traits which behaviour facets include effective interpersonal relationship, ambitiousness, call to duty all very similar to high positive emotions as measured by Savage et al (2014). Additionally, the online football gamblers further showed higher score on low emotional expression (less depression) and openness to experience which has facets including sensation and novel explorations.

Many authors have made distinctions between gamblers with preference for games of chance versus games of skill (Odlaug, Marsh, Kim & Grant, 2011. Share, 2002; Young & Stevens, 2009). For example non-strategic gambling class member were predominantly women, less educated with relatively low income while strategic gambling class members were predominantly men, more educated and had highest yearly income compare to all the latent classes (Savage et al 2014). In terms of personality traits, the two classes differed considerably: the non-strategic gambling class had higher scores on measure of negative emotionally and magical thinking, whereas the strategic class had higher scores on measures of social potency, achievement, boredom susceptibility and thrill and adventure seeking (Savage, et al 2014). The profile of personality traits found among strategic gamblers is also similar in construct to what our findings show in personality traits of online football gamblers when compared to non-gamblers. This is consistent with the theory that the gambling of individuals who prefer games of skill is motivated primarily by intolerance of boredom and stimulation seeking whereas the gambling of individuals who prefer games of chance were motivated primarily by a need to escape from stress or to cope with dyphoric moods (Shape, 2002).

Though our study did not include other classes of gamblers, it confirms the findings that possible different personality traits underlie the motivation for different classes of gambling. The extent to which the online football gamblers (strategic gambling class) significantly differed from the non-gambling group showed high personality trait disposition inherent in this class of gamblers and the extent over which these personality traits propel strategic gambling behaviours.

On the other hand, on the neuropsychological assessment of attention tasks, the online football gamblers performed better than the non-gamblers on the time taken to complete the backward computing task while they (online football gambler) performed significantly worse than non-gamblers on number of errors made on forward addition tasks. It is understandable that many studies on neuro-cognition among gamblers have been carried out but little or no studies have been done on attentional problems among this population. Impulsivity disorder as a sub category of attention deficit hyperactivity disorder is most widely studied. Our present study is among the first studies to look at other measures of attention like attentional control among this population. Studies have shown that gamblers (both strategic and non-strategic) have performed significantly worse than non-gamblers on measures of cognitive flexibility and inhibitory control (Grant, Odlaug & Schreiber, 2012) and measures of impulsivity (Grecucci, Giorgetta & Bonini, 2014; Goudriaan, Oosterlaan, de Beurs & Vanden Bricks, 2006; Mason, O'Sullivan, Bentall & El Deredy, 2012). This may account why in our

study; the online football gamblers made more errors than non-gamblers on the tasks examined. Errors on counting can be linked to impulsivity and impatience; an attribute common among gamblers. However, our study findings showed that online gamblers had significant faster reaction time on backward counting tasks as opposed to non-gamblers. Grecucci et al (2014) showed that gamblers scored higher on impulsivity and high percentage of impatient choices when compared to controls but were faster in terms of reaction time at selecting the smaller, sooner options and discounted rewards more rapidly over time. This finding was similar to our present finding that showed the online gamblers to be faster on time taken but had more errors than the non-gamblers. The question is what explains such faster reaction time. Is it explained on the basis of neural processing speed and improved attentional control or could it be explained as a hyperactive behaviour. The present study was not designed however to answer this question.

The Stroop Word Colour test showed fast processing on the stroop congruence task and significant errors on stroop interference task. The online gamblers showed better performance on both tasks. Time taken to complete the strooop congruence task shows efficient processing speed among the online gamblers compared to the non-gamblers. This supports our result on time taken to complete forward addition task. It appears that online football gamblers show faster processing speed on tests of divided attention as well as focused attention. Stroop colour word test has been shown to assess focused attention (Crawford, Parker & Mckinlay, 1992) as well as executive function, response inhibition and shift in perceptual set (Spreen & Straus, 1998). Our result shows that online football gamblers had response inhibition based on the less errors made on the stroop interference. Whether this performance on the executive function was the outcome of the gambling or existed before the gambling behaviour remains to be studied. Ideally findings have shown that cognitive training through games improves cognitive abilities (Bangirana, Boivin & Giordani, 2013). It may be plausible that regular online football gamblers (strategic gamblers) may have developed such inhibition tendency due to the gambling type they are involved. However, personality factors may not also be ruled out. The online football gamblers also showed high profiles of healthy personality traits. This may as well correlate with their cognitive abilities.

The trail making tests further confirmed the capacity of the online football gamblers for cognitive flexibility and set shifting tasks which forms part of executive function test. The online football gamblers had less time completing the TMT B and as well-made significantly less errors on TMT A. Globally our findings showed that online football gamblers had better speed of processing, high inhibition ability and better capacity in set shifting. However, they showed less performance on backward subtraction task which measures more of divided attention as a model of Paced Auditory Serial Addition Task (PASAT) (Gronwall & Sampson, 1974; Crawford et al 1992). It is true that studies have shown that gamblers performed worse on inhibition and flexibility control than non-gamblers (Grant, Odlauy & Schreiber, 2012) there are issues on the separation of gamblers into types and the types of tasks (neuropsychological test) used in the study. Our participants are strategic gamblers from population of undergraduate students. There is possibility that their educational status and type of gambling behaviour they are involved will likely affect the results of our findings contrary to other studies. Equally our participants were regular gamblers though we were not able to establish pathological gambling behavior. Our result may as well differ if our participants were grouped into regular online football gamblers and pathological online football gamblers. Consequently, our study was the first to study online football gamblers in

Nigeria and subsequent studies are expected for a better understanding of this population in Nigeria.

Limitations of the Study

Our study was not able to show whether the regular gamblers were equally pathological gamblers. This type of dichotomy would have yield further exciting findings. The serial additional/subtraction tasks used was not a gold standard measure of attention. The use of PASAT, symbol digit or digit symbol test could have been a better alternative to the study.

CONCLUSIONS

Generally, our findings show evidence that online football gamblers showed healthy personality traits of affective interpersonal relationship, ambitiousness and positive emotions captured by the agreeableness, conscientiousness, openness to experience and neuroticism subscales of the Big Five Personality Traits. Similarly, they showed better capacity on processing speed and measures of executive functions but deficit on some measures of divided attention.

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