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Gambling and Its Clinical Correlates in University Students

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Abstract

Background—This study sought to examine the prevalence of gambling disorder (GD) in a university sample and its associated physical and mental health correlates.

Methods—A 156-item anonymous online survey was distributed via random email generation to a sample of 9,449 university students. Current use of alcohol and drugs, psychological and physical status, and academic performance were assessed, along with questionnaire-based measures of impulsivity and compulsivity. Positive screens for GD were based upon individuals meeting DSM-5 criteria.

Results—A total of 3,421 participants (59.7% female) were included in the analysis. The overall prevalence of GD was 0.4%, while an additional 8.4% reported subsyndromal symptoms of GD. GD was significantly associated with past-year use of cocaine, heroin/opiate pain medications, sedatives, alcohol, and tobacco. Those with GD were more likely to have generalized anxiety, PTSD, and compulsive sexual behavior. Questionnaire-based measures revealed higher levels of both compulsivity and impulsivity associated with disordered gambling.

Conclusion—Some level of gambling symptomatology is common in young adults and is associated with alcohol and drug use, as well as impulsive and compulsive behaviors. Clinicians should be aware of the presentation of problematic gambling and screen for it in primary care and mental health settings.

Keywords

gambling; addiction; impulsivity; compulsivity

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Introduction

The essential feature of gambling disorder (GD) is persistent and recurrent maladaptive gambling behavior that results in psychosocial dysfunction (APA 2013). Although most people who gamble do so recreationally and report no significant financial consequences or difficulties controlling their behavior, some people show escalations in gambling behavior over time that results in impaired functioning, reduced quality of life, greater risk of bankruptcy, and higher rates of divorce (APA, 2013).

Prevalence estimates for GD have varied based on the timeframe of the study and the instruments used to diagnose the disorder. A meta-analysis of 120 prevalence surveys completed in North America from the late 1970s to the late 1990s found that the lifetime estimate of GD was 1.6% (Schaffer and Vander Bilt, 1999). The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), however, found that only 0.42% of adults in a community sample met lifetime criteria for GD (Petry et al, 2005). It is also notable that there has been an accelerated proliferation of gambling venues during the past decade in multiple parts of the world, particularly with the increasing popularity of online gaming, casinos, and riverboat gambling (<https://globenewswire.com/news-release/2016/09/27/874804/0/en/Worldwide-635-Billion-Gambling-Market-Drivers-Opportunities-Trends-and-Forecasts-2016-2022.html>). As access to gambling becomes easier, some research suggests that there could be a corresponding increase in the rates of GD in the future (Welte et al, 2016).

GD often begins in adolescence (Truong et al. 2017). Since GD likely has negative long-term consequences (Scholes-Balog et al, 2016), it is important to examine the impact of GD specifically within young adult populations. In a meta-analysis of the available literature, the estimated rate of gambling disorder in university students was 6.1%, and 10.2% for problem gambling (Nowak, 2017). Despite this high prevalence, relatively little is known about the associated consequences of GD on academic performance, socialization, and self-esteem in university settings.

GD is now listed as a Substance-Related and Addictive Disorder in DSM-5, in recognition of its overlap with substance use disorders, including in terms of co-morbid occurrence (APA, 2013). Compared to the general population, people with disordered gambling are at several fold increased risk of having substance use disorder (Tackett et al, 2017). In factor modeling, shared variance between gambling and alcohol problems was explained statistically by gambling frequency, and chasing losses, suggesting that understanding the root causes of these behaviors may provide a clue to the origin of both disorders (Tackett et al, 2017).

Impulsivity (a tendency towards premature responses that are risky, leading to undesirable outcomes) is a candidate mechanism predisposing to both gambling and substance use disorders. For example, questionnaire-based measures of impulsivity have been found to be higher in young people with disordered gambling, and a bi-directional relationship has been suggested (Secades-Villa, 2016). In college students, high Barratt Scale impulsivity was associated with gambling-related cognitive biases (Yang et al, 2016). In a meta-analysis of

studies that included a healthy comparison control group, a large effect size (0.96) was found for elevated Barratt motor impulsiveness in GD, larger than effects seen with cognitive task impulsivity measures (Chowdhury et al, 2017).

This study sought to examine both the prevalence of GD in a university sample, as well as the associated emotional and functional consequences of the disorder. Based on the previous literature (King et al., 2010; Pascual-Leone et al., 2011; Walther et al., 2014; Romo et al., 2015), we hypothesized that GD would be associated with poor self-esteem and impairments in academic performance; higher rates of substance problems, depression and anxiety; and elevated questionnaire-measures of impulsivity and compulsivity.

Methods

Survey Design

The Department of Psychiatry and Behavioral Neuroscience at the University of Chicago and Boynton Health at the University of Minnesota jointly developed the *Health and Addictive Behaviors Survey* to assess mental health and well-being in a large sample of university students. The survey included basic demographics as well as questions from a number of validated screening tools examining mental health and psychological well-being. All study procedures were carried out in accordance with the Declaration of Helsinki and were approved by the Institutional Review Board of the University of Minnesota.

Participants

A sub-sample of 10,000 college and graduate students at a large, nondenominational and coeducational Midwestern university were chosen by random, computer-generated selection, from a total pool of approximately 60,000 students at the university. The survey was distributed over a three-week period during fall semester 2016, with invitations being sent via email, and surveys being completed online. Of the 10,000 email invitations, 9449 were successfully received by the recipients (i.e. did not bounce back). Recipients of the email were first required to view the IRB-approved online informed consent page, at which point students could choose to participate in the survey or opt out. The survey asserted that all information was both anonymous and confidential. Compensation was offered at the conclusion of the survey by randomly selecting respondents to receive tablet computers (3 winners) or gift certificates to an online retailer in the amounts of \$250 (4 winners), \$500 (2 winners), and \$1000 (1 winner). Participants were required to review all survey questions to be eligible for prize drawings, but were not required to answer all questions, due to the sensitive nature of some of them. Based on previous data (Petry et al., 2005), we expected the vast majority of respondents (>99%) not to meet criteria for GD and so did not feel the lottery would entice gamblers and generate a need to control for sampling bias. The data suggest that our rates of GD were fairly low compared to previous studies and so it did not over-sample GD participants. Of the 9,449 students who received the invitation to participate, 3,659 (38.7%) completed the survey. This response rate is commensurate with other national or university health surveys (Baruch, 1999; Baruch and Holtom, 2008; Cook et al, 2000; Odlaug et al, 2013; Van Horn et al, 2009).

Assessments

The self-report survey consisted of 156 questions and took participants approximately 30 minutes to complete. Survey questions assessed demographic information (including religious affiliation), sexual behavior, self-reported academic achievement (i.e., grade point average [GPA]), and clinical characteristics, including mental health and substance use issues.

Participants also completed the following measures:

Minnesota Impulsive Disorders Interview (MIDI). The MIDI is a screening instrument for impulse control disorders, including GD (Grant, 2008). The MIDI has shown excellent psychometric properties in preliminary studies (Grant et al., 2005).

Alcohol Use Disorders Identification Test (AUDIT). The AUDIT is a well-validated, 10-item questionnaire used to assess alcohol use behaviors and related problems (Saunders et al, 1993). A score of 8 or greater indicates hazardous or harmful alcohol use.

Drug Abuse Screening Test (DAST-10). The DAST is a valid and reliable 10-item, yes/no measure of problematic substance use. A score of 3 is used to screen for a drug use disorder (Skinner 1982; Yudko et al, 2007).

Patient Health Questionnaire (PHQ-9). The PHQ-9 is a valid 9-item measure of depressive symptoms based directly on DSM-IV-TR criteria for major depressive disorder (Kroenke et al, 2001).

Generalized Anxiety Disorder 7 (GAD-7). The GAD-7 is a valid and reliable 7-item, screening tool for generalized anxiety disorder (GAD) (Spitzer et al, 2006). Total scores of 10 or greater indicate clinically significant anxiety.

Adult ADHD Self-Report Scale (ASRS-v1.1). The ASRS is a 6-item screening tool for attention-deficit/hyperactivity disorder (ADHD) that has demonstrated strong psychometric properties (Kessler et al, 2006).

Rosenberg Self-Esteem Scale (RSES). The RSES is a 10-item scale measuring global feelings of self-worth or self-regard (Rosenberg, 1965). Scores below 15 indicate low self-esteem.

Barratt Impulsiveness Scale, Version 11 (BIS-11). The BIS-11 is a 30-item measure designed to assess impulsivity across three dimensions: attentional (inability to concentrate), motor (acting without thinking), and non-planning (lack of future orientation) (Stanford et al, 2009).

Cambridge-Chicago Compulsivity Trait Scale (CHI-T). The CHI-T is a valid and reliable, 15-item measure of compulsive traits. It captures a broad range of trans-diagnostic aspects of compulsivity, yielding a convenient total score. The scale has shown excellent psychometric properties, with high internal consistency (Cronbach's $\alpha = 0.8$), and excellent convergent validity against gold-standard assessments of compulsive symptoms

(each $p < 0.001$ for gambling disorder, obsessive-compulsive, and substance use disorder symptoms) as well as excellent discriminant validity against other disorders such as depression (Chamberlain and Grant, 2017). Total scores on the scale have correlated significantly with less risk-adjustment on the decision-making task (rigid response style) and divergent validity was confirmed against other cognitive domains (response inhibition and executive planning). Previous validation work showed good convergent validity for a variety of compulsive disorders, as well as excellent discriminant validity against other disorders such as depression (Chamberlain and Grant, 2017).

Data Analysis

Only respondents with complete data on the GD module of the MIDI were included in the analyses ($N = 3421$). Participants were grouped into one of three categories based on their responses to the GD module of the MIDI with respect to the last 12 months: GD (endorsing 4 symptoms); Subsyndromal Gambling (endorsing 1 to 3 symptoms of GD), and No Gambling Problems (0 symptoms of GGD endorsed). Significant main effects of group were identified for demographic and clinical measures using independent sample t tests for continuous variables (or equivalent nonparametric tests, as indicated in the text) and chi-square tests for categorical variables. Post hoc tests were not conducted due to the relatively small size of the GD group, and to avoid excessive multiple comparisons. Effect sizes were calculated for all significant differences, which were determined for t tests using Hedges' g ($g = 0.2$ is a small effect size, 0.5 is medium, and 0.8 is large (36) and for χ^2 with ϕ coefficient (Cramer's V) ($V = 0.1$ is considered a small effect size, 0.3 is medium, and 0.5 is large). SPSS was used for all statistical analyses (version 24; IBM Corp). Statistical significance was defined as $p \leq 0.01$ to account for multiple comparisons.

Results

Of the 3,421 participants who completed the GD module for the survey, 14 (0.4%) met criteria for GD, 286 (8.4%) endorsed 1 to 3 symptoms of GD, and 3,121 (91.2%) did not endorse any GD symptoms. The demographic variables for the entire sample are presented in Table 1. Those with some level of gambling problem were more likely to be male and have lower academic performance (indexed by the GPA).

Alcohol and drug use by the participants is presented in Table 2. Greater gambling symptomatology was significantly associated with greater likelihood of having used cocaine, heroin, hallucinogen, sedatives, prescription pain medications, nicotine products, and e-cigarettes. GD symptoms were also significantly associated with greater likelihood of an alcohol or drug problem.

The mental health aspects of the participants are presented in Table 3. Worse gamble symptomatology was significantly associated with worse depressive and anxiety symptoms and a greater likelihood of having compulsive sexual disorder.

Table 4 presents data regarding the impulsive and compulsive aspects of the participants based on GD status. Worse GD symptoms were associated significantly with more severe

impulsivity, as measured by all domains of the BIS-11, and with more severe compulsivity (measured by the CHI-T scale).

Discussion

This study examined the prevalence of disordered gambling in a large sample of university students; and ways in which disordered gambling was related to a range of demographic/clinical measures, and questionnaire-based measures of impulsivity and compulsivity. Early adulthood is an important time when addictive symptoms may develop, which may then have negative effects during later adulthood as this period is often critical for forming close relationships, scholastic achievements, and developing one's career. We found that the point prevalence of GD was 0.4%, and that the point prevalence of problematic gambling was 8.4%. The rate of GD was somewhat lower than observed in other studies (although not all (Petry et al, 2005)), whereas the rate of problematic gambling was fairly typical (Nowak, 2017; Anagnostopoulos et al, 2017). Of course, rates may be affected by the nature of the sample and the definitions deployed. Because our sample comprised university students, they may be higher functioning than other community cohorts, which may confer some resilience from problematic gambling developed into fully blown GD.

In terms of demographic measures, disordered gambling symptoms were significantly associated with male gender (small effect size), and with a lower grade point average (small effect size). The gender result is consistent with a national study on gambling in US College athletes, which found that males had consistently higher past-year gambling prevalence than women (Huang et al, 2007). In one study in US Colleges and Universities, 1/3 of males and 15% of females were found to gamble once a week or more (Lesieur et al, 1991). Research indicates that women tend to begin gambling later than men, and may seek treatment sooner (Shaffer et al, 2013). The negative association between maladaptive gambling symptoms and GPA is consistent with these symptoms having a negative functional impact on daily functioning even early in the disease trajectory, such as in people with subsyndromal GD.

The current study found that University students with maladaptive gambling had significantly higher rates of multiple types of substance use, both licit and illicit. Maladaptive gambling was significantly associated with the following, with a small effect size: elevated nicotine consumption (and e-cigarette use), alcohol misuse scores (Audit & DAST), amphetamine use, heroin use, prescription painkiller use, and sedative medication use. Interestingly, an extremely strong relationship was seen for past year cocaine use, which had an extremely large effect size for its relationship with maladaptive gambling. These data support the current conceptualization of GD as being related to substance use disorders in general, but they also reveal a particularly strong relationship for cocaine use. Consequences of using some substances may lie years away (such as the long-term negative impact of cigarette smoking on cardiovascular function) whereas other substances (such as heroin or cocaine) can result in short term but more serious consequences. Cognitive, personality, and imaging findings share some remarkable parallels between cocaine use disorder and gambling disorder (for discussion see Spronk et al, 2013 and Ahn et al, 2016).

In terms of other mental health problems in the sample, disordered gambling was significantly associated with symptoms of post-traumatic stress disorder (PTSD), anxiety (GAD-7), and compulsive sexual behavior, all with small effect size. In a study in Veterans, positive correlations were observed between frequencies of different types of baseline so-called 'self-destructive behaviors', including gambling, and severity of PTSD symptoms both at baseline and at follow-up assessments (Lusk et al, 2017). Stress-related emotional states are of central relevance to both PTSD and gambling disorder. In another study, patients with GD had greater traumatic stress symptoms and higher physiological arousal (including relating to PTSD) (Green et al, 2017). Stress may contribute to gambling directly (gambling in response to stressful life events) but also gambling may lead to extreme life events (such as bankruptcy, or binge-use of substances leading to trauma, as a consequence of gambling). Similarly, the relationship between gambling symptoms and anxiety seen here could be in keeping with the idea that anxiety states might lead to individuals gambling with a view to mitigating this state; but in turn, the consequences of gambling may fuel a further escalation of anxiety in a vicious cycle (Medeiros et al, 2016; Martin et al, 2014). Finally, young adults with disordered gambling in this study were also significantly more likely to endorse symptoms of compulsive sexual behavior. The two disorders are frequently comorbid with one another and they appear to overlap in terms of phenomenology, such that both occur in response to urges that are poorly resisted, are associated with trait impulsivity, and are viewed as pleasurable by the individual until secondary, deleterious consequences develop (Derbyshire and Grant, 2015). These findings also align with previous research (Grant and Steinberg, 2005).

Relationships between disordered gambling and certain other forms of psychopathology were not significant in the current study – namely depression (PHQ-9), binge-eating disorder, and attention-deficit hyperactivity disorder (ADHD). This is contrary to our expectations and could be due to limited power. For example, binge-eating disorder was uncommon and so group differences would have been hard to detect; and ADHD was numerically more common in the GD group (42.9%) than the control group (17.6%). Similarly, depressive scores were numerically higher in the GD group than the control group (14.3 versus 4.7). Put differently, these types of psychopathology were numerically but not significantly higher in GD than controls, but effect sizes were very small and so these differences were not significant with the given sample size. In addition, contrary to our hypothesis and previous literature (Walther et al., 2014), the percentage of individuals with poor self-esteem was not significantly higher in those with GD. This, too, could be due to limited power given that numerically more individuals with GD rated as having poor self-esteem or it could be due to variables other than self-esteem driving gambling behavior in this cohort.

Questionnaire-based measures of impulsivity and compulsivity revealed evidence that impulsivity (Barratt questionnaire) and compulsivity (CHI-T questionnaire) were both significantly associated with maladaptive gambling, scores being highest especially in the GD group. This is in keeping with gambling having both impulsive and compulsive elements. The association between gambling and Barratt impulsiveness scores is consistent with extensive previous research (Chowdhury, 2017). The CHI-T is a recently developed trans-diagnostic compulsivity scale, which was developed by the authors due to a relative

paucity of other such instruments in the literature. Elevated scores on the CHI-T is consistent with previous work using the Padua inventory (designed to assess obsessive-compulsive symptoms in normative and patient populations), with several studies reporting elevated sub-scores in GD compared to healthy controls (Blanco et al, 2009; Blaszczyński, 1999; Bottesi et al, 2015).

This study into gambling has the advantage of being relatively large and being conducted in University students, which constitutes a relatively under-studied age group. Nonetheless, there are several limitations that should be noted. The study was cross-sectional and hence the direction of causality of any effects cannot be established – this would require longitudinal designs. There are limitations inherent to the use of online surveys – diagnostic assessment may be less accurate (more “noisy”) compared to in-person assessment by a clinician. Nonetheless, the large sample size helps to overcome this limitation in terms of power to detect even small effects. Lastly, the GD group was small due to the relatively low prevalence of GD (as opposed to subsyndromal GD) in this particular cohort; for this reason we focused on main effects of group rather than examining post hoc tests, which would have been underpowered.

In summary, this study found that GD occurred in 0.4% of University students, and subsyndromal GD occurred in 8.4%. Maladaptive gambling was associated with male gender, higher use of licit and illicit substances (especially cocaine), and with occurrence of certain types of psychopathology (PTSD, anxiety, compulsive sexual behavior). Additionally, maladaptive gambling was associated with higher scores on both impulsive and compulsive questionnaire-based instruments. The findings may have implications for understanding the public health consequences of gambling in young adults in academic settings; highlighting the need to screen for co-occurring disorders. Furthermore, some level of maladaptive gambling (subsyndromal GD) was common – because this may ultimately lead to full GD, targeted early interventions would be helpful in University settings.

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Keypoints

- Problematic gambling behavior is common among university students
- Problematic gambling behavior is associated with specific types of psychopathology (PTSD, anxiety, compulsive sexual behavior).
- Maladaptive gambling is associated with higher scores on both impulsive and compulsive questionnaire-based instruments.

Table 1
Demographics of University Students Based on Gambling Disorder (GD) Status

Variable	No GD symptoms (N=3121)	Subsyndromal GD (N=286)	GD (N=14)	Likelihood ratio χ^2	P-value	Effect size Cramer's V
Gender						
Male	34.6(1079)	61.5(176)	64.3(9)	87.947	<.001	.116
Female	62.0(1935)	36.4(104)	28.6(4)	df=6		
Trans/GenderQueer	1.6(50)	0.3(1)	7.1(1)			
No answer	1.8(57)	1.7(5)	0.0(0)			
Student status						
1 st year undergrad	16.6(517)	15.4(44)	14.3(2)	19.533	.146	.051
2 nd year undergrad	14.7(460)	19.2(55)	7.1(1)	df=14		
3 rd year undergrad	15.9(496)	12.6(36)	28.6(4)			
4 th year undergrad	14.6(456)	14.0(40)	14.3(2)			
5 th year or more undergrad	4.3(133)	5.6(16)	0.0(0)			
Graduate -Master's	14.3(446)	18.5(53)	21.4(3)			
Graduate -Doctoral/Prof	19.0(594)	14.7(42)	14.3(2)			
Non-degree seeking	0.6(19)	0.0(0)	0.0(0)			
Race/ethnicity, Caucasian	74.8(2291)	85.1(240)	71.4(10)	16.576	<.001	.067
				df=2		
Relationship status						
Single	45.6(1422)	40.9(117)	35.7(5)	6.361	.384	.033
Dating	38.7(1208)	42.7(122)	28.6(4)	df=6		
Engaged/married	14.7(459)	15.4(44)	35.7(5)			
Other	1.0(31)	1.0(3)	0.0(0)			
College GPA						
Below 1.50	0.2(5)	0.4(1)	7.1(1)	24.767	.002	.089
1.50-2.49	1.7(51)	0.7(2)	7.1(1)	df=8		
2.50-2.99	8.1(250)	12.6(36)	14.3(2)			
3.00-3.49	33.0(1018)	37.5(107)	50.0(7)			
3.50-4.00	57.0(1757)	48.8(139)	21.4(3)			

All numbers are % (N) unless otherwise stated

Table 2
Drug and Alcohol Use of University Students Based on Gambling Disorder (GD) Status

Variable	No GD symptoms (N=3121)	Subsyndromal GD (N=286)	GD (N=14)	Likelihood ratio χ^2 *	P-value	Effect size Cramer's V
Illicit drug use (lifetime)	39.3(1225)	54.2(155)	64.3(9)	27.535**	<.001	.090
Drug use (past 12 months)						
Amphetamines	2.3(28)	2.0(3)	22.2(2)	5.903	.052	.105
Cocaine	6.8(82)	15.1(23)	22.2(2)	12.593	.002	1.07
Heroin	0.9(11)	0.7(1)	22.2(2)	9.339	.009	.172
Hallucinogens	11.6(140)	13.1(20)	44.4(4)	6.266	.044	.083
Marijuana or hashish	70.2(856)	69.0(107)	88.9(8)	1.903	.386	.034
Prescription pain medication	4.5(54)	7.8(12)	44.4(4)	15.055	.001	.153
Sedatives	4.7(57)	7.8(12)	33.3(3)	9.423	.009	.112
Nicotine (lifetime)	38.4(1197)	56.6(162)	85.7(12)	48.688**	<.001	.119
E-cigarettes (lifetime)	16.9(528)	31.1(89)	42.9(6)	35.802	<.001	.110
Audit score 8 (%)	23.0(718)	44.8(128)	42.9(6)	61.017	<.001	.141
DAST-10 score 3 (%)	7.7(240)	13.6(39)	28.6(4)	15.508	<.001	.076

* Degree of freedom=2

** Pearsons Chi-Square; degrees of freedom=2

Table 3
Mental Health Problems of University Students Based on Gambling Disorder (GD) Status

Variable	No GD symptoms (N=3121)	Subsyndromal GD (N=286)	GD (N=14)	Likelihood ratio χ^2 *	P-value	Effect size Cramer's V
PHQ-9 score 10 (%)	4.7(144)	2.8(8)	14.3(2)	4.383	.112	.039
PC-PTSD score 3 (%)	14.7(456)	9.8(28)	35.7(5)	9.440	.009	.055
GAD-7 score 10 (%)	17.9(551)	13.6(38)	50.0(7)	11.092	.004	.063
Compulsive sexual behavior	3.6(110)	3.6(10)	28.6(4)	10.468	.005	.085
Binge eating disorder	2.5(78)	1.7(5)	0.0(0)	1.385	.500	.017
ADHD	17.6(541)	15.8(45)	42.9(6)	5.431	.066	.045
Rosenberg Self Esteem, below 15 score (%)	15.2(461)	10.6(30)	21.4(3)	5.025	.081	.038

* Degree of freedom=2

Table 4
Impulsivity and Compulsivity of University Students Based on Gambling Disorder (GD) Status

Variable	No GD symptoms (N=3121)	Subsyndromal GD (N=286)	GD (N=14)	Statistic	P-value	Effect Size
Cambridge-Chicago Compulsivity Trait Scale	9.488 (sd=13.56)	7.174 (sd=12.80)	15.700 (sd=17.04)	F(2,3388)=4.897	.008	.191
Barratt Impulsiveness Scale (BIS-11)						
Attentional impulsiveness	16.178 (sd=3.98)	16.444 (sd=3.85)	19.154 (sd=4.96)	F(2,3289)=4.137	.016	.097
Non-planning impulsiveness	22.864 (sd=4.76)	23.599 (sd=4.61)	25.643 (sd=5.55)	F(2,3283)=5.314	.005	.121
Motor impulsiveness	20.225 (sd=3.94)	21.155 (sd=3.84)	25.64 (sd=4.31)	F(2,3297)=19.907	<.001	.215