PREVALENCE OF GAMBLING AMONG RURAL, AFRICAN AMERICAN ADOLESCENTS IN THE STATE OF GEORGIA

by

THERESA R. REILLY

(Under the Direction of Adam S. Goodie)

ABSTRACT

This study examines gambling patterns among rural, African American adolescents, ages 14-17, who are believed to be at especially high risk for problem gambling outcomes. Problem gambling is a rising concern among adolescent populations; youth gamble more frequently relative to adults, and those who gamble are more susceptible than adults to maladaptive outcomes. Being part of a minority or being a low SES individual has been shown to further exacerbate gambling problems, despite lower rates of gambling frequency. This minority sample presents with a disproportionate rate of poverty and is expected to demonstrate a high rate of gambling problems. Prevalence rates of gambling and gambling-related problems are documented; gender differences and risk factors are explored. Gambling problems are found to be differentially associated with skill-based games as opposed to luck-based games. Substance use is a predictor of gambling frequency, and gambling frequency is a predictor of gambling problems.

INDEX WORDS: rural, African American, adolescent, low SES, luck-based games, skill-based games, strategic gambling, non-strategic gambling, problem gambling, prevalence

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DEDICATION

This work, and all I do, is dedicated wholeheartedly to the love of my family. To my parents, who have offered inspiration and strength and who serve the world in incredible ways. To my siblings, who have each been loyal to themselves as they followed their aspirations and who put all things aside to take care of others. To my nieces and nephews, who seem wiser than anyone else in this bunch. And to all of us, for believing in each other and staying strong, when heaven knows it has not always been easy. To each of you, thank you. Things are good, but they are getting better.

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CHAPTER 1

PREVALENCE OF GAMBLING AMONG RURAL, AFRICAN AMERICAN ADOLESCENTS IN THE STATE OF GEORGIA

The problems associated with gambling are well documented (American Psychiatric Association [APA], 2013; Gobet & Schiller, 2014; Kryszajtys et al., 2018; Langham et al., 2015; Martins et al., 2008); however, gamblers are not a homogeneous population. Differences in gambling outcomes exist at the level of the individual, the community, the culture, and even the gaming style. As such, it is not sufficient to refer to gambling "in America" or "among youth." Gambling outcomes vary extensively depending on the subgroup an individual belongs to. The current study examines gambling prevalence in a particularly high-risk and underrepresented population - rural, African American adolescents, ages 14 – 17, who experience disproportionate rates of poverty relative to their non-African American peers.

Gambling Risk

Briefly defined, gambling means risking something of value on an uncertain outcome for the chance to receive something of higher value in return (Williams et al., 2017). There is a great deal of ambiguity surrounding the rules, odds, and value of potential outcomes in most forms of gambling, such that informed, rational decisions are difficult to make (Chambers & Potenza, 2003). This ambiguity masks the fact that a constant feature of gambling is a low likelihood for positive outcomes, a very high likelihood for negative outcomes, and risks which outweigh the benefits.

The majority of gamblers (80% - 85%) do not experience negative consequences and are said to be “social gamblers.” These are individuals who gamble in a recreational context, are able to control their behavior, and as such do not experience long-term negative consequences (Fong, 2005). However, a small but relevant portion of gamblers experience persistent, uncontrollable, or maladaptive gambling that interferes with daily life. Behaviors that are consistent with this pattern are indicative of problem gambling.

Possible consequences of problem gambling include accruing debt; losing property or homes; neglecting family, work, and hobbies; divorce; losing a job; and experiencing emotional distress, such as depression, anxiety, and suicidal thoughts. There is an increased risk for stress-related conditions, such as hypertension, cardiovascular disease, and sleep deprivation among problem gamblers (APA, 2013; Fong, 2005).

Many of the negative outcomes that derive from problem gambling are perceived as primarily applicable to adults, but youth may experience similar negative effects. They may experience legal, vocational, and interpersonal struggles similar to those of adults (Deverensky, 2015). They also experience guilt, stress, anxiety, and depression (Hardoon & Deverensky, 2002; Kryszajtys et al., 2018). The harmful effects of problem gambling are exacerbated among adolescents due to adolescence being a critical period of neural development. Adolescents experience more activity in the reward and habit systems of the brain, and they do not yet have fully developed executive control systems with which to check this hyperactivity (Jordan & Andersen, 2017). Compared to individuals who do not gamble in adolescence, those who do are more likely to experience continued negative physical and psychiatric health outcomes into adulthood (APA, 2013; Goldstein et al., 2009).

If certain clinical criteria are met, as established by the DSM 5, then a person may be diagnosed with Gambling Disorder (GD). The current study is conducted outside of a clinical context, so the term problem gambling will be used, rather than GD, to designate negative outcomes related to gambling activity (Carlson & Moore, 1998). When applicable, GD-consistent symptoms will be noted.

Risks for Adolescent Gambling

Gambling is a restricted activity for minors; nevertheless, studies reveal that minors are able to, and do, participate in gambling activities at high rates (Kryszajtys et al., 2018; Schiller & Gobet, 2014). The knowledge that minors are gambling at high rates is concerning, not only because it is unlawful, but because gambling during adolescence is riskier than adult gambling (Carlson & Moore, 1998; Kryszajtys et al., 2018). Relative to adults, adolescents are more susceptible to developing addictions of *any* type (Crews et al., 2007), including Gambling Disorder (GD), and they are more likely to maintain their addictions (Jordan & Andersen, 2017). The prevalence of GD among adolescents, which is two to four times the rate of GD among adults, is evidentiary of the elevated level of risk present for adolescents who engage in such activities (Chambers & Potenza, 2003; Sussman et al., 2011). Furthermore, research shows that adolescents do not need to participate in gambling to be affected by it; adolescents who are exposed to gambling, regardless of their own involvement, are more likely to develop gambling problems as adults (King et al., 2009).

Prevalence of Adolescent Gambling

Prevalence rates for adolescent gambling vary across the literature; however, some findings remain consistent. Underage adolescents are gambling, are doing so at

higher rates than adults, are exhibiting higher rates of *problem* gambling relative to adults, and the prevalence rates for adolescents are increasing, both in terms of problem gambling and social (or non-problematic) gambling (Carlson & Moore, 1998; Chambers & Potenza, 2003; Goldstein et al., 2009; Martins, 2008; Shaffer & Hall, 2001; Sussman et al., 2011; Winters et al., 1993). Minors report participating in both legal and illegal forms of gambling, and they report encountering few barriers to participating in legal forms, which should be inaccessible to them due to age restrictions (Carlson & Moore, 1998; Deverensky, 2015).

Hardoon, Gupta and Deverensky (2004) found that 66% of participants age 12-19 had gambled in the past year. Martins (2008) found prevalence rates between 77% and 83% for adolescents, and Winters et al. (2002) found prevalence rates up to 86% for participants age 15-18. Goldstein (2009) found lower prevalence rates for ages 14-18, at only 22.5%, but this sample was recruited from youth presenting to an inner-city emergency department, with African Americans being over-represented. A large-scale study of students in Minnesota public schools found 70% of male and 37% of female 9th graders gambled in the past year; and 83% of male and 60% of female 12th graders gambled in the past year (Stinchfield, 2000).

The average age of gambling onset for American youth is between nine and 10 years old, and the average onset of *purchasing* lottery tickets is age 12.12 (Felsher et al., 2004; Hardoon & Deverensky, 2002; Wilber & Potenza, 2006). The earlier gambling onset occurs, the more likely an individual will experience severe gambling problems, both as an adolescent and as an adult (Hardoon & Deverensky, 2002; Rahman et al., 2012). Systematic reviews report prevalence rates for GD among teenagers to be between

2.1% and 10% (Shaffer & Hall, 2001; Sussman et al., 2011). By contrast, studies of U.S. adults determine GD prevalence to be between 1% and 3% (Sussman et al., 2011). According to the DSM 5, GD presents in about 0.2 - 0.3% of the general population, with lifetime prevalence up to 1% (APA, 2013).

Risk Factors Associated with Gambling

The role of gambling as a process addiction rather than a substance use addiction may make it seem less deleterious; however, neurophysiological research reveals that gambling and drug use operate on similar neurobehavioral mechanisms and follow the same patterns, suggesting an etiological relationship between substance use and gambling addiction (Chambers & Potenza, 2003; APA, 2013; Kryszajtys, 2018). It is not surprising, then, that the most commonly reported comorbidities for problem gambling are substance use and alcohol use, regardless of gender, social status, race, ethnicity or age group (Fong, 2005; Martins et al., 2008; Schiller & Gobet, 2014; Welsh et al., 2014; Winters et al., 2002).

Problem gamblers report high levels of depression, anxiety, other mood disorders, and personality disorders, with anxiety and depression being more common among female gamblers relative to male gamblers (Chambers & Potenza, 2003; Desai & Potenza, 2008; APA, 2013; Gobet & Schiller, 2014; Welsh et al., 2014). Non-violent criminal offenses and hostility are reported at high levels among male gamblers (Kryszajtys et al., 2018).

Gambling Types

Gambling games have been meaningfully divided into strategic, or skill-based games, and non-strategic, or luck-based games in previous research (Chantall &

Vallerand, 1996; Goodie, 2015; Martins, et al., 2008). Findings show that game preference can differentially predict problem gambling outcomes. Research among adult gamblers shows that those who engage in skill-based games are more likely to be male and have more gambling problems (Boldero & Bell, 2012; Martins, et al., 2008). One explanation for the link between skill gambling and gambling problems may be explained by the illusion of control - a cognitive distortion which is paramount in games of skill (Goodie & Fortune, 2013). In games of skill, players believe they have the ability to control the outcome of the game, despite their input having a negligible influence. In some cases, the increased skill may lead to better chances; however, all games include an element of luck, and the influence of skill does not change the outcome markedly (Chantall & Vallerand, 1996). Prior research links problem gambling with decision-making deficits and higher cognitive biases, such as the illusion of control (Schiller & Gobet, 2014).

Conversely, research conducted with youth shows that an earlier age of gambling onset is associated with luck-based games, rather than skill-based games (Fesher at al., 2004). Studies report lottery games as the preferred gambling type among adolescents (Griffiths & Barnes, 2008; Jacobs, 2000). Zhou et al. (2011) found that luck-based gambling, rather than skill-based gambling, was a predictor of gambling frequency. Among youth, non-strategic, luck-based games were linked to problem gambling severity and earlier onset GD (Rahman et al., 2012). Some research suggests that the variation in findings is a result of gender difference (Carlson & Moore, 1998). The current study will investigate whether skill and luck as distinct gambling categories will describe gambling

in this sample, as well as determine whether one, if either, is a better predictor of negative gambling outcomes.

Rural, African American Adolescents

Findings from the current gambling literature show that males gamble more frequently than females. Adolescents experience more problems relative to adults; minorities experience more problems relative to Caucasians; and lower SES is associated with more gambling problems (Deverensky, 2015; Welte et al., 2007).

African Americans are less likely to gamble overall and research shows no clear preference for gambling type; but when they do gamble, they do so more heavily and exhibit more problems than other racial groups (Welte et al., 2002). A nationally-representative sample revealed that, although African Americans gamble less frequently, they experience problem gambling rates twice that of Whites (Alegria et al., 2009). In another study of inner-city youth, being male and African American was associated with more gambling problems, betting larger amounts of money, and gambling more frequently relative to non-African Americans, despite fewer individuals reporting gambling participation (Goldstein et al., 2009). In a study of 17-year old urban African American adolescents, past-year gambling prevalence was 47.4% (56.6% of males, 36.5% of females), and gambling problems presented at 29.8% (Martins, et al., 2008). Other underage samples in the literature, which do not emphasize any particular race or ethnicity, report much lower problem gambling rates - between 2% and 10% (Martins, 2008; Sussman et al., 2011).

To date, there is sufficient research to demonstrate that African Americans and adolescents are at higher risk for problematic outcomes relative to Caucasians and adults.

However, there are few studies of adolescent gambling that focus on African Americans. Prior studies tend to have low African American representation, in addition to low base-rates of gambling among African Americans, making it difficult to detect effects among this group. Studies that do focus on African Americans focus on inner-city and urban samples. Current studies of rural African American youth risk factors do not include gambling measures. As such, rural individuals are not yet represented in gambling studies of African American adolescents.

The current study intends to document the prevalence of gambling among this unique subgroup. Although substance use, depression, and hostility are commonly cited comorbidities of gambling, it is unknown if this holds true for rural youth. Although urban African American adolescents tend to experience a disproportionate rate of gambling problems, it is unknown whether this holds true for rural youth. Likewise, although general samples of adolescents present high rates of gambling activity, it is unknown whether gambling is occurring in rural adolescent populations. Previous research has made invaluable contributions to understanding the topography of African American risk factors and adolescent gambling, but the group in question for this study remains unrepresented.

We expect that gambling prevalence will be detected in our sample; however, it will be lower than what is reported in the current literature for adolescent samples due to lower prevalence of gambling among African Americans. We expect that gambling problems will be higher than the 2% - 10% range documented among general adolescent samples due to the higher rates of gambling problems that present among African Americans. Based on current studies, we expect to see more male than female gamblers,

and males should present with more gambling problems and higher gambling frequency relative to females. Due to the high rate of poverty among this sample, poverty status will be explored as a potential predictor of negative gambling outcomes. Substance use should be a significant predictor of gambling problems for both males and females. Gambling problems may also be closely tied to hostility and depression. We expect hostility and depression to be significant predictors of gambling problems; however, based on prior research, hostility should be predictive for males and depression should be predictive for females. Skill and luck gaming types will be examined to determine if current theories regarding type of gaming pertain to an African American, adolescent sample.

CHAPTER 2

Method

Design

Field interviewers working with the Strong African American Families (SAAF)-STEPS project administered a battery of scales and questionnaires to rural African American adolescents and their primary caregivers. The SAAF program is a family-centered preventive intervention that focuses on alcohol use as the primary outcome measure. As part of the project, six waves of data were collected on a number of measures, including gambling activity. This study uses a follow-up wave of data from the randomized prevention trial to assess gambling outcomes. Assignment to prevention conditions was controlled to address potential variability (Kogan et al., 2019).

Interviewers were African American community members who traveled to the homes of participants for data collection. They obtained informed consent and informed assent at each visit. Participants responded to measures using self-interviews made available through audio-assisted laptop computers. Caregivers were compensated $100 and youth were compensated $40 for their participation. The University of Georgia Institutional Review Board (IRB) approved all procedures and compensation for this study.

Participants

Families were recruited from eight rural Georgia counties through the public school system. Schools provided lists of African American families, and researchers

contacted those families to determine eligibility and interest in participation. Eligibility was determined by having a child in the home who self-identified as African American or Black and would reach age 11 or 12 during Wave 1. Ultimately, 472 target adolescent-primary caregiver pairs (N = 944) were recruited for Wave 1, at a 76% recruitment rate. Due to budgetary constraints, Wave 6 participants were randomly sampled from the original trial, such that 270 of the original 472 target-caregiver pairs participated (N = 540 caregivers and youth). Attrition analysis revealed there were no significant differences in target gender, caregiver gender, poverty status, or monthly income from Wave 1 to Wave 6, ($t(470) = .598$, $p = .550$, $t(470) = .644$, $p = .520$, $t(470) = -0.228$, $p = .819$, $t(439) = .599$, $p = .996$, respectively).

Target adolescents were 51% female (n = 242) and 10-12 years of age (M = 11.26) during Wave 1, and 51% female (n = 139) and 14-17 years of age (M = 15.84) during Wave 6. The majority of primary caregivers were female (96%, n = 259). Adolescents mostly indicated a parent as the primary caregiver (92%), but some also reported living with a grandparent, aunt/uncle, sibling, or other caregiver. Income was not used as a screening factor, but our sample of rural African Americans is disproportionately more impoverished relative to the general rural population of Georgia. Of the sample, 54% (n = 146) of participants reported living below the federal poverty threshold, while the overall poverty rate for rural Georgia is 20.9% (Rural Health Information Hub, 2018).

Target adolescents are the focus of the current study. For more information about the primary caregiver-target adolescent relationship as it pertains to gambling outcomes, see Reilly et al., *in prep*.

Measures

Gambling Measures

Gambling measures to be tested include gambling status, gambling frequency, gaming type (luck/skill), and gambling problems. Adolescents responded to a gambling questionnaire which yielded measures of gambling type, gambling frequency, problem gambling behaviors and problem gambling symptoms. Gambling status was determined as "gambler" if the participant endorsed at least one type of gambling and "non-gambler" if the participant endorsed zero types of gambling.

Questions about gaming type were adapted from the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987) and reworded to be more appropriate for the adolescent audience (see Table 1 for full list of items). Adolescents responded to nine questions about the types of gambling they had participated in during the past 12 months. Participants responded on a Likert scale from 1 (*never*) to four (*at least once per week*). A frequency index was created by converting responses to a 0 - 3 scale and summing the scores, such that a score of zero indicates an individual who did not report any gambling, and 27 indicates the highest possible score.

Individuals were categorized by gambling type depending on whether they endorsed skill-based games, luck-based games, or both. Luck-based games included slot machines and poker machines, Bingo, picking lottery numbers, lottery scratch games, and online lottery games. Skill-based games included playing cards, dice, or flipping coins; betting on games of personal skill, like pool or bowling; betting on sports teams; and betting on internet or video games (Martins, et al., 2008).

Questions about gambling behaviors were adopted from the South Oaks Gambling Screen – revised for adolescents (SOGS-RA; Winters et al., 1993) and the DSM 5 (APA, 2013). Adolescents responded to a total of sixteen dichotomous (*yes/no*) questions about gambling behaviors exhibited over the past 12 months. Seven questions addressed commonly reported gambling-related problems from the SOGS-RA, and the remaining nine questions addressed the nine symptoms of Gambling Disorder outlined in the DSM 5. Problem behaviors are distinguished as those that produce negative consequences, whereas symptoms are those specifically outlined by the DSM 5 as diagnostic criteria. Separate indices were created for gambling problems and gambling symptoms by summing the number of items endorsed.

Risk Factors

Youth depression was measured using the Center for Epidemiologic Studies Depression Scale for Children (CES-DC; Weissman et al., 1980). The CES-DC is modified from the adult version CES-D (Radloff, 1977) and includes 20 Likert format self-report questions, ranging from 0 (*not at all*) to 3 (*A lot*). Weissman et al. (1980) suggest that a score of 16 or higher indicates high risk for depression. The APA recognizes the CES-D as a suitable scale for a range of age groups, races and ethnicities (APA, 2020).

Hostility was measured using a subscale of the Client Evaluation and Self Treatment form (CEST; Institute of Behavioral Research, 2007). The Hostility subscale is an eight-item, self-report measure with a 1 (*strongly disagree*) to 4 (*strongly agree*) Likert response set, which has been shown to have good psychometric properties (Joe, et al., 2002). A hostility index was calculated by summing the Likert responses, such that a

score of eight would indicate the lowest hostility, and a score of 32 would indicate the highest hostility. Wave 6 coefficient alpha reliability was .90.

Participants self-reported substance use for the three-month period directly preceding the study. Questions asked about frequency of marijuana use, tobacco use, alcohol use, and binge drinking. Items used in this questionnaire have been used in previous research with similar populations (Brody et al., 2006; Brody et al, 2012). Participants indicated the frequency with which they had used each category of substance, ranging from 0 (*none*) to 6 (*30 or more times*). For cigarette use, the scale ranged from 0 (*none*) to 6 (*about 2 packs/day*). Scores were standardized and summed to create a cumulative substance use index.

Data Analysis Plan

Initially, we described the prevalence of gambling in the whole sample, then we examined prevalence rates by gender. We then used a Confirmatory Factory Analysis (CFA) to test a two-factor model of gambling activity based on games of skill and games of luck. Analyses were conducted to determine if type of game endorsed differed based on gender, and correlations were examined between game type, gambling frequency, and gambling problems. Logistic regression models were used to determine the predictive utility of gambling frequency and gambling problems on the risk factors of depression, hostility, and substance use. Gender was assessed as a possible moderator for all models. Factorial ANOVA was used to analyze the effect of gambling status and gender on depression, hostility, and substance use, and interactions were explored. Finally, t-tests were used to determine if gambling outcomes (status, frequency, type, problems) differed based on poverty status.

CHAPTER 3

Results

Gambling Prevalence

The overall past-year gambling prevalence of the 270 adolescents surveyed during Wave 6 was estimated to be 38% (n = 102), based on self-report of at least one type of gambling for money or valuables during the past 12 months. Of the entire sample, 28% of females (n = 39) and 48% of males (n = 63) had gambled in the past year, and males (M = 2.09, SD = 3.53) gambled more frequently than females (M = 0.62, SD = 1.82, t(191.5) = 4.27, $p < 0.001$). Of those who gambled, 38% (n = 39) were female and 62% (n = 63) were male, and males (M = 4.29 SD = 4.07) gambled more frequently than females (M = 2.31, SD = 2.89, t(98.04) = -2.87, p = .005). The average frequency score among those who gambled was 3.53 (SD = 3.8).

Of the 102 adolescents who reported some type of gambling, 31 also reported at least one problematic behavior associated with gambling. In other words, 11% of the total sample, or 30% of those adolescents who gamble, are at risk for developing Gambling Disorder (GD). Twenty-eight adolescents (10% of total, 27% of gamblers) indicated at least one problem symptom as designated by DSM 5 diagnostic criteria, suggesting risk for GD. Six adolescents endorsed four or more of the DSM 5 symptoms, which would be consistent with a designation of GD (2% of total, 6% of gamblers). These findings are especially noteworthy because all adolescents in our sample are below the legal gambling age in Georgia.

Due to the low rate of participants who reported gambling problems consistent with DSM 5 symptoms, all further analyses were conducted using a cumulative index of all 16 problem items, including problem behaviors and problem symptoms, herein referred to as "gambling problems." The mean number of total gambling problems endorsed was 1.15 (*SD* = 2.23), and males experienced more gambling problems relative to females (*M* = 1.47, *SD* = 2.32, *M* = 0.61, *SD* = 1.98, respectively, *t*(87.58) = 1.997, *p* = 0.049). There was a moderate correlation between gambling frequency and gambling problems (*r* = .42, *p* < .001). This correlation did not hold true for females who gambled (*r* = 0.1, *p* = .536), but it was significant for males who gambled (*r* = 0.50, *p* < .001).

The three most popular types of gambling among adolescents were all skill-based games, including betting on sports teams (*n* = 58), betting on personal games of skill (*n* = 41), and betting on internet or video games (*n* = 39, see Table 1 for percentages for each gaming type).

Gaming Types

A confirmatory factor analysis (CFA) was conducted to test a two-factor model of gambling activity based on gaming type (games of luck or games of skill). The data for this analysis included nine gambling items from the SOGS; five items measured the participants' frequency of luck-based gambling activity, and four items measured the participants' frequency of skill-based gambling activity.

CFA analysis was conducted using the lavaan package, version 0.6-7, in R version 1.3.1073. The maximum likelihood (ML) method was used for estimation, and full information maximum likelihood (FIML) was used to account for missing data. The model fit was good based on the CFI (.92). Using the more conservative TFI yielded an

acceptable fit, although not excellent (.89). AIC (1671.57) and sample-size adjusted BIC (1661.43) were acceptable. RMSEA was acceptable (.097, 90%CI[.056 - .136]), but the *p* of close fit did not indicate good fit ($p = .032$). Taken together, these scores suggest the model is a good fit. The model indicates that gambling activity is a function of two distinct factors of luck and skill (see Figure 1 and Table 2 for factor loadings).

Of the 102 adolescents who reported gambling, 61 (60% of gamblers, 22.7% of total sample) reported engaging in skill gambling exclusively, 20 (19.6% of gamblers, 7.4% of total sample) reported engaging in luck gambling exclusively, and 21 (20.6% of gamblers, 7.8% of total sample) reported engaging in both types of gambling.

In this sample, participants who engaged in games of skill were more likely to have gambling-related problems ($r = 0.39$, $p < .01$) and tended to gamble more frequently, ($r = .786$, $p < .01$), relative to those who engaged in games of luck. Comparing those who did or did not live below poverty using gambling factor scores revealed a significant correlation for games of skill, such that skill-gamblers were less likely to be those who lived below poverty ($r = 0.164$, $p < .01$). There was no association between poverty and games of luck. Males ($M = 0.38$, $SD = 1.29$) were significantly more likely to gamble on games of skill relative to females ($M = -0.36$, $SD = 0.34$, $t(146.95) = 6.31$, $p < 0.001$), but there was no significant difference between males and females on games of luck (mean difference = 0.1).

Risk Factors for Gambling

Depression

A factorial ANOVA was conducted to examine the relationship between gender, gambling status, and depression. There was no main effect of gender ($p = .383$) or

gambling status (p = .929) on CES-D scores, and there was no interaction between gender and gambling status (p = .845). Depression levels were not self-reported as being different between males, females, gamblers or non-gamblers. CES-D scores did not predict gambling frequency or gambling problems.

Hostility

A factorial ANOVA was conducted to examine the relationship between gender, gambling status, and hostility. There was a significant main effect of gambling status such that those who gambled (M = 15.26, SD = 6.42) displayed more hostility relative to those who did not gamble, (M = 13.8, SD = 5.73, F(1,265) = 4.99, p = .026). There was no significant main effect of gender (p = .12), and there was no significant interaction effect between gender and gambling status, (p = .230). Individuals who gambled displayed higher hostility scores regardless of gender (see Figure 2). Hostility scores predicted gambling frequency in a linear regression model, (F(1,100) = 12.27, p = .001, R^2 = 0.11), but they did not predict gambling problems.

Substance Use

Gambling Status

A factorial ANOVA was conducted to examine the relationship between gender, gambling status, and substance use. In the overall sample, there was no main effect of gender on substance use (p = .791), and there was no interaction between gender and gambling status (p = .843). However, there was a main effect of gambling status, such that those who gambled (M = 0.69, SD = 1.6) engaged in more substance use relative to non-gamblers (M = 0.16, SD = 0.66, F(1,265) = 13.6, p < .001). (see Figure 3). Gambling status was predictive of substance use, regardless of gender.

Gambling Frequency

Linear regression was used to examine the predictive value of substance use on gambling frequency. The substance use questionnaire was a significant predictor of gambling frequency and explained 23% of variance for the whole sample (n = 269, F(1, 267) = 81.74, p < .001). Adding gender to the model explained an additional 6.2% of variance (F(2, 266) = 56.62, p < .001). A hierarchal multiple regression determined there was an interaction between gender and substance use. Gender moderated the effect of substance use on gambling frequency, as evidenced by an increase in total variation explained of 1.2%, F(1,265) = 4.59, p = .03. See Figure 4.

Gambling Problems

Linear regression was used to examine the predictive value of substance use on gambling problems among those who gambled (n = 102). The substance use questionnaire alone was not a significant predictor of gambling problems, but gender was (F(1,100) = 1.05, p = .31, F(1,99) = 4.78, p = .031, respectively). A hierarchal multiple regression determined there was an interaction between gender and substance useon gambling problems. Gender moderated the effect of substance use on past year gambling problems, as evidenced by an increase in total variation explained of 5.5%, F(1,98) = 6.04, p = .016 See Figure 5.

Poverty Status

There were no significant differences in gambling frequency, gambling problems, or gambling status based on poverty status.

CHAPTER 4

Discussion

Findings in this study reveal that rural, African American adolescents are gambling at non-negligible rates, but the frequency of gambling is considerably lower than the frequency reported in previous studies of general adolescent samples (Hardoon et al., 2002; Stinchfield, 2000; Welte et al., 2002; Winters et al, 2002). However, as expected, the rate of gambling problems is higher than what has been reported in previous studies of general adolescent samples (Welte et al., 2002). This sample also exhibits a much higher rate of symptoms consistent with GD diagnosis relative to what is reported for the general population (2%, compared to 0.2% - 0.3%; APA, 2013).

Males gambled more frequently than females, had more gambling problems, and were more likely to endorse skill-based gambling. Skill-based gambling was a strong preference for gamblers in this sample, with over 80% of gamblers endorsing at least one type of skill-based game, and 60% endorsing skill-based games exclusively. This finding differs from studies that find youth typically prefer games of luck, (Fesher at al., 2004; Griffiths & Barnes, 2008; Jacobs, 2000; Zhou et al., 2011) and it is worrisome because skill-based games were found to be associated with increased gambling frequency and a higher rate of gambling problems.

Substance use, poverty, depression, and hostility did not predict gambling problems; however, the low base-rate of gambling problems in this sample diminished the amount of power available to detect an effect. It is possible that at this age, gambling

is occurring but problems have not yet developed. Gambling frequency was associated with gambling problems, so frequency is used in lieu of gambling problems.

Gambling frequency predicted past-three-month substance use. Males in the general sample had higher substance use scores relative to females, but this effect disappeared among gamblers, such that there was no difference between males and females in substance use scores. Rather, *all* gamblers demonstrated high substance use. Substance use was predictive of gambling status, regardless of gender. Hostility was associated with gambling status, but did not predict frequency or problems. Again, hostility did not differ between males and females among those who gambled. Rather, *all* gamblers demonstrated higher levels of hostility.

The age of gambling onset is unknown in the sample because gambling measures were not added until Wave 6; however, we can ascertain that by 15-16 years old, 38% of this sample had engaged in past-year gambling activity, and 30% of those who gambled have at least one problem behavior associated with gambling.

Limitations

Prevalence rates for adolescent gambling vary depending on region, variance in local regulations, differing attitudes between communities, demographic variables, and type of measurement used. Therefore, it is difficult to make clear comparisons across studies. Further, the majority of accepted gambling measures are intended for use with adults, although some versions have been adapted to meet the unique needs of adolescents (Carlson & Moore, 1998). The gambling measures used in this study were adapted forms of those adult versions. This study, and others, face the limitation of acquiring accurate prevalence rates that are generalizable to the greater population. The

findings presented here are specific to Georgia, as gambling regulations vary greatly from state to state. This study was somewhat exploratory in nature - although analyses were theoretically driven with regard to gambling among subgroups, it was difficult to predict outcomes based on combination of these demographic features. The exploratory nature underscores the need to replicate findings in future waves of data.

All participants had been assessed multiple times by the SAAF-Steps project, reporting on high-risk and illegal activities without any negative repercussions; as such, there was no reason to believe there would be deception on a significant scale. However, the nature of self-report data, as compared to clinical data, necessitates there will be a certain level of error.

Conclusions

Even in a conservative state such as Georgia, with strict regulations and limited forms of legalized gambling, among minors who are not permitted to gamble legally, this study finds a high rate of gambling and a high rate of problem gambling. The problems that derive from gambling addiction tend to be thought of as “adult” problems, such as jeopardizing a career, encountering marital problems, or losing one’s home. However, adolescents suffer from the same maladaptive behavior patterns - they are affected in their personal and interpersonal relationships, financially, vocationally and in physical health (Delfabbro & King, 2012; Holdsworth et al., 2015; Kryszajtys et al., 2018). The heightened vulnerability of an adolescent brain is the rationale behind age-restricting potentially addictive behaviors, such as smoking and drinking. Gambling is no exception, but because the harm of gambling is not as readily obvious as the harm of substance use - and the negative behaviors that derive from problem gambling are not easily identifiable -

gambling compulsions may go unnoticed and untreated for longer periods of time, allowing an addiction to fester well into adulthood as adolescents struggle to control their gambling behavior (Kryszajtys et al., 2018).

Gambling is often overlooked as a risky behavior (Deverensky, 2015), but the more research develops, the more obvious it becomes that gambling is part of a larger spectrum of risky behaviors. Despite many adults, caregivers, and teachers believing that gambling is low-level risk factor (Deverensky, 2015), it routinely presents in a constellation of other high-level risk factors and should, at the very least, be considered subsyndromal to a larger risk syndrome. Given the frequency with which gambling occurs in conjunction with substance use, in particular, a sensible plan of action is to blend gambling prevention strategies with the array of existing intervention programs that are administered to at-risk youth (Martins et al., 2014).

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Table 1

Types of Gambling Endorsed among Target Adolescents

Question (During the past 12 months, how often have you bet/gambled, even casually, for money or valuables in the following ways?)	CFA Component	*N*	% of Total Population	% of Gamblers
Played cards or dice, or flipped coins, for money.	Skill	26	10%	25%
Bet on games of personal skill, like pool, golf, or bowling.	Skill	41	15%	40%
Bet on sports teams.	Skill	58	22%	57%
Played Bingo for money.	Luck	13	5%	13%
Played slot machines, poker machines, or other gambling machines.	Luck	10	4%	10%
Played lottery games by picking numbers, like PowerBall, Cash 4 or Cash 5.	Luck	9	3%	9%
Played the lottery's scratch games.	Luck	25	9%	25%
Played the lottery's online games.	Luck	7	3%	7%
Bet on internet or video games.	Skill	39	15%	38%

Table 2

CFA Factor Loadings for Two-Factor Solution Using Whole Sample Data with FIML Approach

Latent Factor	Indicator	B	SE	Z	Beta	Sig
Luck	Bingo	0.394	0.057	6.883	0.635	<.001
Luck	Slots	0.515	0.045	11.391	0.916	<.001
Luck	Pick numbers	0.351	0.054	6.493	0.606	<.001
Luck	Scratch	0.091	0.068	1.333	0.138	0.183
Luck	Online lotto	0.437	0.041	10.658	0.877	<.001
Skill	Personal Skill	0.641	0.082	7.808	0.75	<.001
Skill	Cards and dice	0.629	0.075	8.428	0.802	<.001
Skill	Sports	0.613	0.092	6.674	0.655	<.001
Skill	Internet and video	0.327	0.099	3.303	0.352	0.001

*Solution converged in 22 iterations.

Figure 1

CFA Factor Loadings for Two-Factor Solution Using Whole Sample Data with FIML Approach

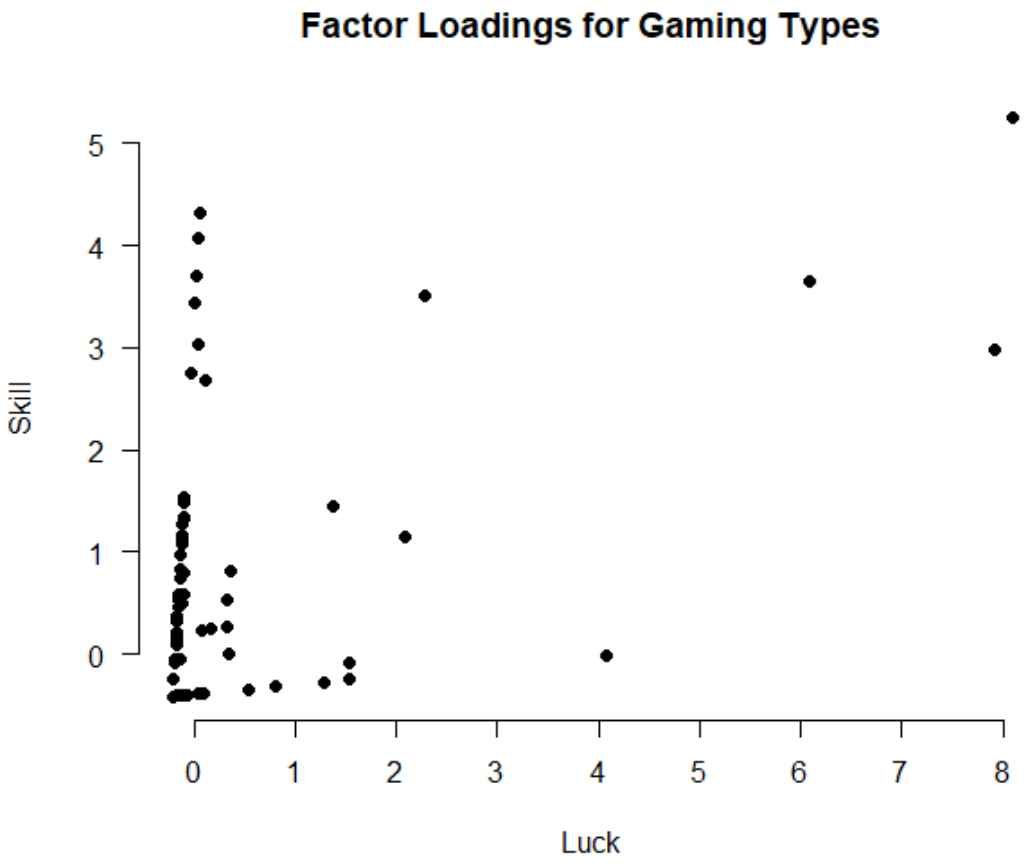

Figure 2

Plot Showing Effect Between Gambling Status and Gender for Hostility Scores

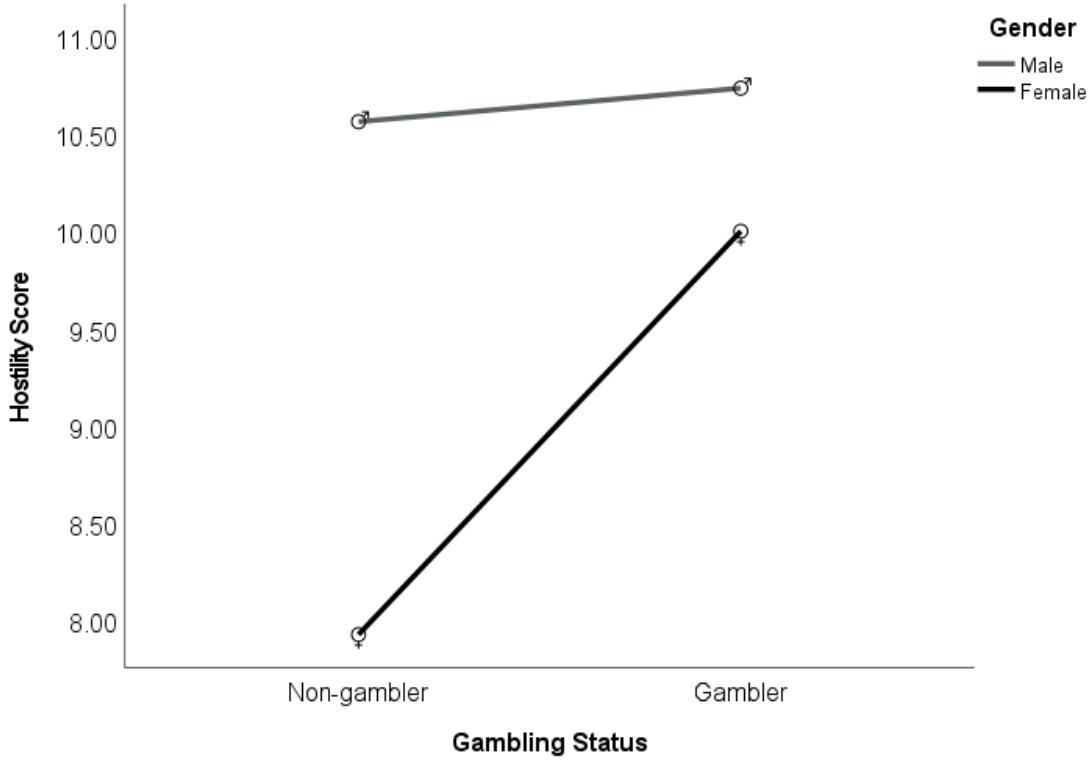

Figure 3

Plot Showing Main Effect of Gambling Status on Past Three-Month Substance Use Scores

Figure 4

Plot Showing Interaction between Gender and Substance Use on Gambling Frequency

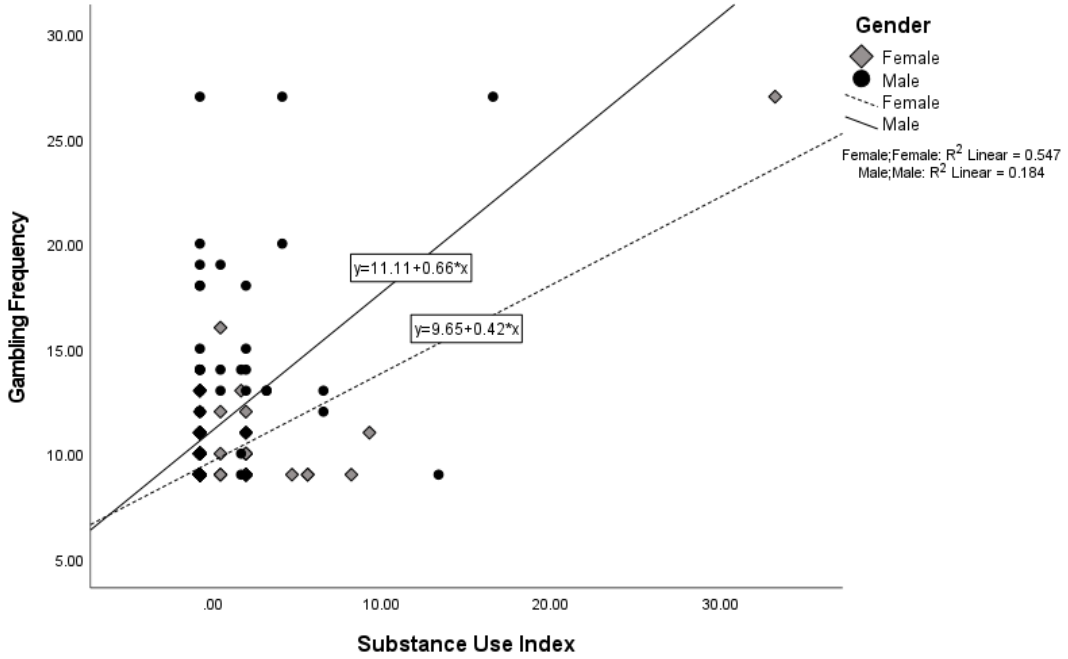

Figure 5

Plot Showing Interaction between Gender and Substance Use on Gambling Problems