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Age Differences in Overall Functioning, Gambling-Related Symptoms, and Comorbid Conditions Among Gamblers

Ryan Nicholson[1], Corey S. Mackenzie[1,4*], Tracie O. Afifi[2], Matthew Keough[3] and Jitender Sareen[4]

[1]*Department of Psychology, University of Manitoba, Canada*

[2]*Department of Community Health Sciences, University of Manitoba, Canada*

[3]*Department of Psychology, York University, Canada*

[4]*Department of Psychiatry, University of Manitoba, Canada*

***Correspondence to:**
Corey S. Mackenzie
Department of Psychology
University of Manitoba
P516 Duff Roblin Building, 190 Dysart Road
Winnipeg, MB, Canada.
E-mail: corey.mackenzie@umanitoba.ca

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Abstract

Objectives: Previous research has examined the role of age in health and functioning among gamblers. This study aims to provide greater understanding of this relationship by comparing younger, middle-aged, and older gamblers with respect to their mental and physical functioning, comorbid psychological disorders, and other gambling-related features.

Method: This study utilized data from the National Epidemiological Survey for Alcohol and Related Conditions (NESARC) with adults meeting one or more DSM-5 disordered gambling symptoms categorized into three age groups: 18 to 34 years old (N = 436), 35 to 54 years old (N = 453), and 55 to 98 years old (N = 321).

Results: Older adults were less likely to qualify for a DSM-5 disordered gambling diagnosis, had lower physical functioning, less help-seeking behavior, lower prevalence of comorbid psychiatric conditions, and were more likely to play a single game (versus multiple games) within a casino (versus outside of a casino) compared to other age groups. The three age groups also differed in terms of the DSM-5 gambling criteria endorsed. Age also moderated the influence of one indicator of quality of life and gambling severity: lower social functioning was associated with increased gambling severity to a greater extent in younger and middle-aged adults than in older adults.

Conclusion: Our findings suggest that older adults meeting at least one disordered gambling criterion experience less severe gambling symptomatology and better mental health, but poorer physical functioning that may be a product of aging. We propose that lower gambling prevalence and better mental health in older adult gamblers is consistent with socioemotional theories of successful aging.

Keywords

Gambling, Comorbidity, Addiction, Lifespan

Introduction

Similar to most addictions, disordered gambling impacts individuals across the adult lifespan [1-3]. However, research suggests that disordered gambling presents differently depending on age, including the types of games played and prevalence rates [1, 4]. The increasing accessibility of gambling both in and out

of the casino, including video lottery terminals (VLTs) in public locations, greater access to sports gambling due to relaxed regulations, Internet and home cash-game poker popularity, and the recent boom in fantasy sports wagering [5], emphasizes the importance of understanding the features and mental health conditions associated with disordered gambling behaviors across the adult lifespan. The purpose of this study is to examine age differences in gambling-related symptoms and features, comorbid psychiatric disorders, and physical and mental functioning in gamblers meeting at least one DSM-5 disordered gambling criteria.

Age Differences in Gambling

The prevalence of disordered gambling does not remain static over the course of the lifespan. Overall, a meta-analyses of pathological gambling found that between 0.2 and 2.1% of the population suffer from disordered gambling, with approximately 0.5 to 4.0% experiencing sub-threshold gambling problems [6]. Age-specific prevalence estimates vary between studies, although across studies a consistent general pattern is found with younger and middle-aged adults exhibiting higher prevalence of disordered gambling than older adults [3, 7, 8]. More specifically, rates of past-year gambling participation peaked for those 22 to 30 years old, while problem gambling behaviors peaked later for those 31 to 40 [3]. Regarding older adults, general prevalence estimates suggest that approximately 10 to 13 percent of individuals over the age of 60 gamble frequently [9].

Aside from prevalence, research suggests that the characteristics of pathological gamblers may also vary depending on the age of onset of the disorder. A study by Verduna Vizcaino and colleagues compared characteristics of early-onset (age 25 or less) and late-onset (age 26 or above) gamblers in a nationally-representative sample of Americans [10]. Early onset gamblers were more likely to be male, single and never married, have an income below $70,000, and exhibit traits of cluster B personality disorders than were late onset gamblers.

Many younger adults who gamble do so in a healthy, non-addictive manner while others develop symptoms of disordered gambling. When gambling in younger adults becomes problematic, it is associated with a variety of negative outcomes, including poor academic performance and comorbid psychological disorders [11, 12]. The pathways model of problem gambling [2, 13, 14, 15] proposes that three pathways exist in the development of disordered gambling: behaviorally conditioned, emotionally vulnerable, and behaviorally vulnerable. This model has mostly been tested with young adult and adult populations [2].

Like younger adults, older adults who gamble do so recreationally and non-pathologically. Engaging in gambling and gambling-related activities is generally seen as beneficial for older adults, providing the opportunity to socialize and obtain social support. Research suggests that the majority of older adults who engage in gambling are best classified as 'social gamblers' who visit the casino infrequently as a social activity, similar to any other planned social outing [16]. Those who endorse socialization as their main motivation for going to the casino and gambling are likely to visit the casino infrequently, as they more frequently partake in other social outings not centered on gambling, and do not experience any adverse or problematic outcomes due to their gambling behaviors [17].

For those older adults whose gambling is not social and healthy, however, many have experienced problem gambling episodes for prolonged periods through their lifetimes, while others will develop these problems starting in later life. Generally, the most significant predictors of problematic gambling in older adults are unresolved losses and 'mismanagement of life stressors' [18]. Three potential pathways have been identified to help explain both risk and protective factors in the development of disordered gambling behaviors in older adults, all of which are connected to isolation [18]. The first 'grief pathway' involves problem gambling when feeling upset or needing personal space that results from a desire to avoid negative emotion related to unresolved losses. The second 'habit pathway' involves using gambling as a means of addressing a relatively minor unmet need, with initial positive experiences leading to habituation. The third 'dormant pathway' involves pre-existing comorbidities or vulnerabilities that manifest as a gambling addiction as an older adult. These three pathways appear to correspond to those proposed to exist in all adults [14], with behaviorally conditioned equivalent to habit, emotionally vulnerable similar to grief, and behaviorally vulnerable equivalent to dormant. However, in older adults, there is an extra emphasis placed on the role of isolation, unresolved losses, and mismanagement of life stressors [18].

Prior research therefore suggests that most younger and older adults who gamble do so in healthy ways, with a subset engaging in disordered gambling through three pathways. There is theoretical reason to expect that problem gambling should become less common with increasing age. Strength and vulnerability integration (SAVI) theory [19] suggests that aging enhances older adults' ability to cope with problems and disengage from negative emotions. However, when stressors are chronic, significant, and unavoidable, age no longer provides these advantages. Instead, older adults must rely on the physiological ability to regulate stress, which generally decreases over the course of the lifespan. Theoretically, according to SAVI, older adults who begin to gamble late in life may do so as a means of coping with, or escaping from, other problems including reduced functionality or comorbid conditions.

Gambling and Comorbid Psychiatric Disorders

In the DSM-5, gambling was diagnostically reclassified as a substance-related disorder rather than its previous classification as an impulse control disorder [20]. The World Health Organization [21] also now classifies gambling as a behavioral addiction in the ICD-11. One of the main reasons for this reclassification is the close similarity that gambling exhibits in relation to others substance use disorders when it comes to motives for use [22, 23]. As individuals frequently employ substances as a means of coping with, or escaping from, negative affect, it stands to reason that this relationship may become excessive and develop into what would be best described as a mental health problem.

Much like other substance use disorders, disordered gambling is associated with a variety of comorbid psychiatric conditions and health difficulties across the lifespan [24, 25]. This includes, but is not limited to, major depression, bipolar disorder, post-traumatic stress disorder, generalized anxiety disorder, specific phobia, hypomania, and substance use disorders [25-32]. One study found as many as 96% of individuals with a lifetime gambling disorder diagnosis met criteria for at least one other lifetime psychiatric disorder [33].

A meta-analytic review found that DSM-IV pathological gambling was highly comorbid with mental health disorders such as any substance use disorder including alcohol and nicotine (57.5%), any mood disorder (37.9%), and any anxiety disorder (37.4%) [34]. Another meta-analysis reviewed the comorbidity of treatment seeking gamblers who may or may not have met the criteria for a clinical diagnosis with DSM-IV Axis I disorders (i.e., mood, anxiety, and substance) [35]. The findings suggest strong relationships between gambling and any current mood disorder (23.1%), any current alcohol or substance use disorder (22.2%), and any current anxiety disorder (17.6%). When compared to non-gamblers, problem gamblers are five to six times more likely to experience a substance use disorder and three times more likely to experience a mood and/or anxiety disorder over the course of their lifetimes [36], whereas in a recent longitudinal case-control study of 427 problem gamblers versus 1583 controls, the risk of lifetime mood, anxiety, and substance disorders was two to three times higher in the gambling group [37]. Psychiatric comorbidities are often more severe in individuals who have been diagnosed with pathological gambling compared to those who have not [34]. For example, among individuals diagnosed with major depressive disorder, pathological gambling was associated with increased likelihood of suicidal ideation and suicide attempts [38]. Problem gamblers also score higher on measures of bodily pain and lower on measures of physical functioning and general health than recreational or non-gamblers [30].

While gambling is associated with comorbid psychiatric disorders in both younger and older adults, a study of Spanish treatment-seeking gamblers suggests that age is associated with differing clinical outcomes and comorbid conditions [39]. This study observed that older disordered gamblers exhibited more comorbid health difficulties, which may be explained by the idea that long-term gambling in older adults has a negative effect on somatic symptoms and mental capacities [31, 40]. For example, engaging in casino gambling may lead to fewer opportunities to engage with others in a meaningful manner, a lack of exercise, spending many hours sitting, and being in an area with frequent nicotine and alcohol consumption, high stress, high anxiety, and poor nutrition, to name a few potentially harmful outcomes.

Current Study

Previous examinations of pathological gambling and comorbid disorders with age have been conducted on samples of treatment-seeking gamblers or strictly on groups of in-treatment pathological or disordered gamblers. Our goal was to extend this previous research by comparing gamblers (those who meet DSM-5 criteria, as well as sub-threshold gamblers) of differing age groups in a nationally representative sample. The current study compares physical and mental functioning, gambling-related symptoms, and the prevalence of comorbid mental health conditions in gamblers among three age groups: young adults (18 to 34 years old), middle adults (35 to 54 years old), and older adults (55 to 98 years old). Based on previous research, we expected that older adults would experience fewer comorbid psychiatric conditions and poorer overall physical and mental functioning. Further, we expected age to moderate the relationship between both physical and mental functioning domains and gambling severity. Based on SAVI theory, we hypothesized that age would strengthen associations between gambling and poor physical functioning, and weaken associations between gambling and negative mental health outcomes.

Method

Participants

Data were from the National Epidemiological Survey for Alcohol and Related Conditions (NESARC), a nationally representative, cross-sectional sample of American adult's ages 18 years or older. The NESARC utilized a structured diagnostic survey. Wave 1 was collected between 2001 and 2002 through in-person interviews, with 43,093 total participants completing the survey for an 81.0% response rate. More recent versions of the NESARC, namely NESARC Wave 2, collected between 2004 and 2005, and the NESARC-III, collected between 2012 and 2013, did not assess gambling. The NESARC was chosen for analyses as it includes the largest number of individuals qualifying for a diagnosis of DSM-IV pathological gambling in any nationally representative sample in addition to assessing for individual psychological disorders [41]. Information regarding sampling procedures and quality control have been previously detailed by Grant and Dawson [42]. For this type of study, formal consent is not required.

Measures

Within the NESARC, the Alcohol Use Disorder and Associated Disabilities Interview (AUDADIS-IV) assessed gambling, gambling-related measures, and other psychiatric disorders.

Gambling. Gambling was measured via the AUDADIS-IV according to DSM-IV criteria. In order to examine participants with current gambling problems, gambling measures were limited to past-year experiences. Participants were screened into the gambling module if they answered positively to an item asking if they had gambled five or more times within the past year with participants who responded 'yes' completing the remainder of the gambling items. Fifteen questions were asked in order to operationalize the ten pathological gambling criteria outlined in the DSM-IV. To examine gambling as outlined in the DSM-5 [43], we eliminated the illegal acts criterion, resulting in nine disordered gambling criteria. This study includes gamblers who endorse one or more of the DSM-5 disordered gambling criteria. Gambling research frequently

includes sub-threshold gamblers in order to increase statistical power. Previous research has also supported the inclusion of sub-threshold gamblers as they are more similar to pathological gamblers than recreational gamblers [44]. Further, others have suggested that endorsing even one gambling symptom may be a sign of difficulties related to disordered gambling behaviors [45-50]. In an effort to capture individuals experiencing any sort of difficulty with gambling behaviors, participants meeting at least one DSM-5 disordered gambling criterion were accepted for inclusion in this study. In the analyses examining gambling as a disorder, participants were required to endorse a minimum of four of the nine DSM-5 criteria to receive a disordered gambling diagnosis [41,48, 50].

The NESARC assessed other gambling-related items as part of the AUDADIS gambling module, including: (1) type of game played, (2) age of pathological gambling onset, and (3) whether the individual had sought a form of professional help for gambling. For type of game played, participants were asked whether they had participated in any of 15 different forms of gambling. In-casino games included card games, dice games, roulette, slot/video machines, and other casino games. Assessed games outside of the casino included bingo/keno, dice games, dog races/fights, card games, games of skill, horse races, lottery, sports games, stock or commodities markets, and other gambling. For age of pathological gambling onset, we utilized the participant age in years at their first episode. To assess help seeking for gambling, participants were asked whether they had ever attended Gamblers Anonymous or gone to 'any kind of counselor, therapist, doctor, psychologist, or any other professional'. Only participants who qualified for a DSM-IV pathological gambling diagnoses responded to these gambling-related items. Therefore, while most analyses include all participants meeting at least one DSM-5 gambling criterion, regressions examining gaming type, age of onset, and whether participants had sought help for gambling issues were limited to those meeting five or more of the ten DSM-IV gambling criteria.

Substance-use disorder. Past year substance-use disorders were examined in accordance with DSM-IV criteria [51]. We combined 'abuse' and 'dependence' into a single 'abuse or dependence' variable for each substance assessed, excluding nicotine. Reliability for substance use disorders was good [κ = 0.74] [52].

Psychiatric disorders and health measures. The AUDADIS-IV assessed anxiety disorders (i.e., panic disorder without agoraphobia, panic disorder with agoraphobia, social anxiety disorder, specific phobia, and generalized anxiety disorder) and mood disorders (i.e., major depressive episode, dysthymic disorder, and hypomanic episode) according to DSM-IV criteria. Reliability for the mood and anxiety disorder diagnoses was fair to good [κ = 0.40 – 0.65] [52]. Both past-year and lifetime disorders were examined. Past-year diagnoses were grouped into larger categories such as 'any mood disorder' or 'any anxiety disorder' to improve statistical power. Lifetime diagnoses were examined as individual disorders.

The AUDADIS-IV assessed for the following personality disorders according to DSM-IV criteria: antisocial, avoidant, dependent, obsessive-compulsive, paranoid, schizoid, and histrionic, as well as conduct disorder without antisocial personality disorder. Other personality disorders, including borderline, schizotypal, and narcissistic were only assessed in Wave 2 of the NESARC and, therefore, were unavailable for examination in the current study. Reliability for the personality disorder diagnoses was fair to good [κ = 0.40 – 0.67] [52].

Participants completed the Short-Form 12 Health Survey - Version 2 [53], which assessed overall physical and mental health quality of life. The 12 items form two subscales (mental and physical disability) and eight domains that measure areas of disability: social functioning, general health, vitality, physical functioning, physical role, mental health, emotional role, and body pain. The SF-12 subscales and domains were examined during regression analyses, while the eight domains were the focus of the moderation analysis described later. Scores for each domain range are norm-based, ranging from 0 to 100 with higher scores indicating lower levels of disability and better health.

Age. We categorized participants into three age groups: young adults (18 to 34 years old), middle-aged adults (35 to 54 years old), and older adults (55 to 98 years old). Our decision to classify those 55+ as older is consistent with previous aging and gambling research [9, 54, 55] and is similar to the age groups used by Granero and colleagues [39].

Other sociodemographic factors. Information regarding sociodemographic factors included sex, marital status, race/ethnicity, total past year household income, and highest level of education attained. Sex was categorized as 'male' or 'female'. Marital status categories were 'single or never married', 'married or cohabitating', and 'divorced, separated, or widowed'. Race/ethnicity was categorized into 'White', 'Black', 'American Indian or Alaska Native', 'Asian, Hawaiian, or Pacific Islander', and 'Hispanic'. Total past year income was categorized into: '<$19,999', '$20,000 to $34,999', '$35,000-$69,999', and '$70,000 and above'. Highest level of education was categorized into 'less than high school', 'high school diploma or GED', and 'post-secondary education'.

Data Analyses

Weighted frequencies and cross-tabulations assessed differences among categorical sociodemographic factors across the three age groups (18-34 years old, 35-54 years old, and 55-98 years old) for individuals meeting at least one DSM-5 disordered gambling criterion.

To test our first hypothesis that age will vary with comorbid health conditions and overall measures of functioning, binary logistic (for categorical dependent variables) and linear (for continuous dependent variables) regression analyses compared gambling-related measures between the three age groups. Each of these analyses utilized a significance value of $p < 0.01$ to correct for Type I error.

To examine our second hypothesis that age would moderate the relationship between functioning and gambling severity, linear regression analyses examined the potential moderating effect of age on the severity of disordered gambling as

measured by the number of disordered gambling criteria endorsed. Specifically, we expected that age would moderate the effect of physical and mental health on gambling severity, with older adults showing a stronger relationship between physical and mental health on gambling severity. Age, the eight domains of the SF-12, and the eight 'age by SF-12' interaction terms were regressed onto a continuous variable for gambling severity, as measured by the number of DSM-5 disordered gambling criteria met. We created interaction terms by centering each variable before creating the interaction term to aid interpretation of the interactions. After conducting these regression analysis, any non-significant interaction terms were subsequently removed before running the final version of the regression model. Moderation analyses employed a significance value of $p < 0.05$ to determine whether interaction terms from the original models were retained in the final model.

We analyzed the data using the complex samples module of the SPSS statistical software (version 24) with the Taylor Series Linearization method used to account for the complex survey design of the NESARC, including clustering and stratification. All percentages were calculated using survey weights.

Results

Of the 43,093 participants completing Wave 1 of the NESARC, 11,153 endorsed having gambled at least five times in any previous year. Of these gamblers, 1,210 endorsed at least one of the nine DSM-5 disordered gambling criteria, including 436 in the young adult group, 453 in the middle age group, and 321 in the older adult age group. Sociodemographic comparisons between age groups for participants meeting at least one disordered gambling criteria are displayed in table 1. Across age groups, the majority of participants were White and male. Most participants had a post-secondary education and, in the oldest two age groups, were most likely to be married. We hypothesized that age would vary with overall measures of functioning and gambling features. The results of the logistic and linear regressions examining associations between age groups and both gambling features and quality of life (i.e., SF-12 scales) are shown in table 2. In these analyses, which were restricted to individuals who met criteria for a lifetime DSM-IV gambling disorder, age of gambling onset differed between all three age groups with the duration of their current problematic gambling behavior(s) being significantly longer in the middle and older age groups compared to the younger adult group. The oldest group was less likely than the other two groups to meet DSM-5 criteria for past-year disordered gambling. The oldest age group had a lower likelihood of seeking professional help for problem gambling behaviors.

In terms of SF-12 scores, physical functioning declined significantly (indicating worsening health) across age groups, whereas mental functioning among older adults was similar to the young group and better than the middle-aged group. All three age groups differed significantly from one another on the SF-12 domains of physical functioning, body pain, general health, and vitality, with worsening functionality in these domains with increased age. The youngest group was found to be in better health on the domains of physical role, emotional role, and social functioning than the other two groups. Older

Table 1: Sociodemographic comparison between age groups for participants endorsing at least one DSM-5 disordered gambling diagnostic symptom.

	Age 18-34 Years (N = 436)		Age 35-54 Years (N = 453)		Age 55-98 Years (N = 321)	
	N	%	N	%	N	%
Sex	F(1.96, 127.06) = 127.53, p < 0.001					
Male	281	70.8	251	63.1	158	54.3
Female	155	29.2	202	36.9	163	45.7
Marital Status	F(3.86, 250.60) = 12349.40, p < 0.001					
Single (never married)	253	55.3	90	14.5	20	4.8
Married / Cohabitating	151	39.0	233	63.4	163	65.1
Divorced/Separated/Widowed	32	5.7	130	22.2	138	30.1
Total Household Income Before Taxes	F(4.42, 287.44) = 1010.55, p < 0.001					
< $19,999	114	21.8	98	16.6	110	26.2
$20,000 - $34,999	100	20.7	76	15.9	74	21.2
$35,000 - $69,999	147	36.8	157	32.3	89	31.8
$70,000+	75	20.7	122	35.2	48	20.9
Ethnicity	F(4.82, 313.45) = 521.58, p < 0.001					
White	210	62.9	247	73.1	212	78.3
Black	117	17.8	111	13.5	61	10.0
American Indian/Alaska Native	8	1.9	13	2.5	5	1.8
Asian/Hawaiian/Pacific Islander	21	7.0	16	3.4	9	4.6
Hispanic	80	10.4	66	7.5	34	5.3
Highest Level of Education	F(3.41, 221.30) = 645.19, p < 0.001					
Less than High School	74	14.0	78	14.5	80	22.6
High School Diploma or GED	145	34.3	130	30.0	111	37.3
Post Secondary Education	217	51.7	245	55.4	130	40.1

Table 2: Linear and logistic regression analyses examining age group differences in gambling features and quality of life (SF-12) among gamblers meeting at least one DSM-5 disordered gambling diagnostic criterion.

	Age Groups			
	18-34 Years (N = 436)	35-54 Years (N = 453)	55-98 Years (N = 321)	p
Gambling Features				
Age of PG onset (years)	21.85[a]	38.24[b]	57.26[c]	<0.001
Duration of PG	4.17[a]	7.02[b]	8.65[b]	0.002
Number of DSM gambling criteria	1.98[a]	1.79[b]	1.68[b]	<0.001
Past-year DSM-5 disordered gambling	38.5%[a]	36.2%[a]	25.4%[b]	<0.001
Lifetime helpseeking for gambling	41.4%[a]	34.4%[b]	24.1%[a]	<0.001
SF-12 Scales				
Physical functioning	54.36[a]	50.14[b]	46.62[c]	<0.001
Role physical	54.05[a]	50.33[b]	45.83[b]	<0.001
Body pain	51.66[a]	48.44[b]	45.61[c]	<0.001
General health	52.79[a]	47.37[b]	43.81[c]	<0.001
Vitality	54.06[a]	52.38[b]	50.67[c]	<0.001
Social functioning	52.29[a]	49.21[b]	49.29[b]	<0.001
Role emotional	51.85[a]	49.29[b]	48.78[b]	<0.001
Mental health	50.53[a]	48.67[b]	49.42[a,b]	<0.001

N values are unweighted. %s are weighted. Similar superscript letters denote no statistically significant difference ($p > 0.01$) while dissimilar superscript letters indicate a significant difference ($p < 0.01$).

adults showed better mental health compared to the middle age group but worse mental health than the youngest group.

Addressing the hypothesis that game type would differ with age, results found in table 3 show that older adults were particularly likely to play one game (84.2%), either slot machines or VLTs (62.9%), and did so nearly always in the confines of a casino (97.5%). On the other hand, the majority of those in the youngest age group played more than one game with 71.3% playing a game outside of the casino, compared to just 15.9% of older adults playing outside of the casino. It should be noted that the power of the game type analyses was limited by game type items of the NESARC only being asked of those meeting DSM-IV pathological gambling criteria (i.e., at least 5 of 10 DSM-IV criteria met).

Specific criteria were found to present differently between age groups, as per our hypothesis that age would vary with DSM-5 gambling criteria. Mean scores and test of age group differences shown in table 3 indicate that the youngest age group was more likely to endorse a need to gamble with increasing amounts, more likely to chase losses, and less likely to gamble as a means of escaping or relieving mood than middle and older age groups. Older adults were less for finances, and

Table 3: Logistic regression analyses examining age group differences in gambling-related variables.

	Age Groups			
	18-34	35-54	55-98	p
Gambling Participation (Only DSM-IV PG)	N = 27	N = 34	N = 13	
Played more than one game type	15 (62.9%)[a,b]	13 (31.3%)[b]	4 (15.8%)[a]	0.057
Played game type in a casino	14 (56.6%)[a,b]	23 (66.8%)[b]	12 (97.5%)[a]	0.024
Played game type outside of casino	19 (71.3%)[a,b]	20 (57.8%)[b]	4 (15.9%)[a]	0.063
Played slot or video machine	6 (25.2%)[a]	18 (49.9%)[a]	9 (62.9%)[a]	0.039
DSM-5 Criteria Met	N = 436	N = 453	N = 321	
Preoccupation with gambling	260 (60.0%)[a]	258 (56.2%)[a]	182 (58.7%)[a]	0.494
Need to gamble with increasing amounts	157 (36.1%)[a]	129 (27.6%)[b]	75 (23.5%)[b]	<0.001
Unsuccessful efforts to reduce gambling	51 (10.4%)[a]	71 (12.0%)[a]	41 (12.2%)[a]	0.456
Restless or irritable when attempting to stop	17 (4.2%)[a,b]	30 (4.6%)[a]	13 (3.0%)[b]	<0.001
Gambles to escape or relieve mood	100 (21.0%)[a]	173 (35.8%)[b]	104 (32.0%)[b]	<0.001
Chasing losses	181 (43.7%)[a]	117 (23.3%)[b]	71 (22.9%)[b]	<0.001
Lies to others to conceal extent of gambling	66 (16.3%)[a]	70 (12.9%)[a,b]	42 (13.2%)[b]	0.015
Risked/lost significant relationship/career	12 (1.7%)[a,b]	16 (2.5%)[a]	4 (1.3%)[b]	0.002
Relies on others for finances	21 (5.0%)[a]	19 (3.5%)[a]	7 (0.9%)[b]	<0.001

N values are unweighted. %s are weighted. Similar superscript letters denote no statistically significant difference ($p > 0.01$) while dissimilar superscript letters indicate a significant difference ($p < 0.01$).

were less likely to be irritable or restless when attempting to stop gambling than the middle aged group. The older adult group were also less likely to lie to conceal the extent of their gambling than the youngest age group.

To examine our hypothesis that age would vary with comorbid mental health conditions, table 4 shows the results of binary logistic regressions between age and comorbid mental health conditions. All assessed past-year mental health disorder groupings were associated with age. Specifically, the prevalence of any anxiety disorder, alcohol use disorder, any substance use disorder, and any mental health disorder were found to decrease with age.

Similarly, all assessed personality disorders were associated with age. The oldest age group was significantly less likely to meet criteria for conduct disorder without antisocial, dependent, paranoid, schizoid, and histrionic personality disorders compared to the other two age groups. Conversely, the oldest age group was more likely to meet avoidant PD criteria compared to the middle age group. The middle age group was more likely to meet obsessive-compulsive PD criteria than the other two groups. Antisocial PD was the only assessed personality disorder to consistently decline over the course of the lifespan.

To examine the hypothesis that age would moderate the relationship between quality of life indicators and gambling severity, we conducted regression analyses including interaction terms between age and all eight SF-12 domains (see Table 5). Only the final model is displayed in table 5. In the first version of the model, interaction terms between age and physical role as well as age and social functioning were significant contributors to the model. These were retained into the final model where age by physical role interaction term was no longer significant (p = 0.921) while age by social functioning (p = 0.001) interaction remained significant. An examination of the conditional effects of social functioning on gambling severity by age group suggests that lower social functioning was associated with increased gambling severity to a greater extent in younger and middle-aged adults, and this relationship was attenuated among the older adults.

Table 5: Final model representing the extent to which age moderates the influence of quality of life indicators (SF-12) on gambling severity.

	# of DSM-5 PG Criteria Endorsed			
	p	B/β	95% CI	
Age	<0.001	-0.001	-0.001	-0.001
SF-12 – Physical functioning	0.532	0.000	-0.001	0.000
SF-12 – Physical role	0.472	0.000	-0.001	0.002
SF-12 – Bodily pain	0.295	0.000	0.000	0.000
SF-12 – General health	<0.001	-0.001	-0.001	-0.001
SF-12 – Vitality	0.343	0.000	0.000	0.001
SF-12 – Social functioning	0.003	-0.002	-0.003	-0.001
SF-12 – Emotional role	0.663	0.000	0.000	0.001
SF-12 – Mental health	<0.001	-0.001	-0.002	-0.001
Age * SF-12 – Physical role	0.921	7.165E-7	-1.368E-5	1.511E-5
Age * SF-12 – Social functioning	0.001	3.526E-5	1.426E-5	5.625E-5

Table 4: Logistic regression analyses examining age group differences in comorbid mental health disorders among gamblers meeting as least one past-year disordered gambling criteria.

	Age Groups			
	18-34 (N = 436)	35-54 (N = 453)	55-98 (N = 321)	p
Past Year Mental Health Disorder Groupings				
Any mood or anxiety disorder	152 (32.5%)[a]	160 (35.1%)[a]	87 (24.7%)[b]	<0.001
Any mood disorder	96 (19.0%)[a]	94 (20.8%)[a]	51 (13.4%)[b]	<0.001
Any anxiety disorder	94 (21.3%)[a]	114 (26.8%)[b]	50 (14.7%)[c]	<0.001
Alcohol use disorder	153 (36.8%)[a]	94 (22.7%)[b]	26 (6.2%)[c]	<0.001
Drug including marijuana disorder	49 (12.9%)[a]	17 (3.3%)[b]	3 (0.9%)[b]	<0.001
Any substance use disorder	167 (40.1%)[a]	100 (23.7%)[b]	27 (6.7%)[c]	<0.001
Any mood, anxiety, alcohol, drug disorder	250 (56.3%)[a]	214 (48.5%)[b]	106 (29.5%)[c]	<0.001
Lifetime Personality Disorder				
Conduct disorder (w/o antisocial)	14 (2.7%)[a]	8 (3.4%)[a]	3 (0.9%)[b]	<0.001
Antisocial PD	74 (16.7%)[a]	45 (10.5%)[b]	19 (6.4%)[c]	<0.001
Avoidant PD	23 (6.0%)[a,b]	35 (6.7%)[a]	10 (3.4%)[b]	<0.001
Dependent PD	7 (1.5%)[a]	8 (0.9%)[a]	1 (0.3%)[b]	<0.001
Obsessive-compulsive PD	75 (15.2%)[a]	93 (20.6%)[b]	51 (13.1%)[a]	<0.001
Paranoid PD	71 (14.1%)[a]	68 (14.8%)[a]	25 (8.2%)[b]	<0.001
Schizoid PD	42 (9.5%)[a]	42 (8.1%)[a]	14 (4.7%)[b]	<0.001
Histrionic PD	47 (10.3%)[a]	33 (6.8%)[a]	8 (2.1%)[b]	<0.001

N values are unweighted. %s are weighted. Similar superscript letters denote no statistically significant difference (p > 0.01) while dissimilar superscript letters indicate a significant difference (p < 0.01).

Discussion

The current study examined the way gambling-related features, including prevalence of comorbid psychiatric disorders and both mental and physical functioning, vary across the lifespan. The findings of the study indicate that the ways in which gambling behaviors and comorbid disorders present in individuals meeting at least one disordered gambling criteria vary over the course of the lifespan. Older adults are more likely than other age groups to have decreased general functionality and health, more likely to play a single casino game, and less likely to present with a past-year comorbid mental health condition. The three age groups also differed in the DSM-5 gambling symptoms observed. These results generally supported our hypothesis that age would attenuate the relationship between gambling, well-being, and comorbid mental health conditions. Finally, age moderated the relationship between social functioning and gambling severity but did not moderate the same proposed relationship with any other domains of functioning. The relationship between lower social functioning and greater gambling severity was stronger in young and middle age adults than in older adults.

Younger adults had better health and functioning than at least one other age group (i.e., younger or middle-aged adults) on both SF-12 summary scales and all eight SF-12 domains of emotional and physical functioning. On four of the domains (i.e., physical functioning, body pain, general health, and vitality), the scores differed between all three groups with youngest age group having the best functioning in these domains and the oldest age group having the worst functioning, partially supporting our hypothesis based on natural age-related declines in physical function, as measured by SF-12 or related measures [56, 57, 58] . The youngest group had better health/functioning in the remainder of the domains (i.e., role physical, social functioning, role emotional, and mental health) than at least one of the other two age groups, with minimal differences observed between the middle and oldest age groups. SAVI theory would suggest that physical health naturally declines while mental health should generally improve unless there are vulnerabilities that nullify age-related emotional advantages [19]. This is supported by our findings that older age was associated with worse scores on domains of physical functioning (i.e., physical functioning, body pain, general health, and vitality) while minimal differences between older adults and middle age adults were observed in domains of mental functioning (i.e., role physical, social functioning, role emotional, and mental health). Previous studies have also found that younger adults in general are less likely to present with difficulties in physical or emotional functioning while older adults in general have poorer overall health [39, 59]. Furthermore, past research has shown gamblers to be more likely to experience poorer overall mental and physical health compared to their non-gambling counterparts [34, 60, 61]. Though this may be a simple product of aging in some cases, others may experience gambling as the primary disorder, as Granero and colleagues [39] indicate. For these individuals, the largely sedentary act of gambling coupled with either the isolation frequently involved with online gaming or the common substance use observed within casinos may result in worsening physical and mental functioning over time [31, 39].

Significant age group differences were observed in the endorsement of DSM-5 gambling criteria. The youngest age group was more likely to chase losses and need to gamble with increasing amounts to achieve the same level of excitement than other age groups. Chasing losses has been noted as a criterion that tends to set problem or pathological gamblers apart from more recreational gamblers in young adults and may serve as an indicator of increasing severity in the future [46, 48, 62]. Older adults, on the other hand, presented with the number of total symptoms endorsed and differed most from the youngest group in terms of symptoms endorsed. While the youngest group endorsed the need for increased stimulation to reach a desired excitement level, the motivation for older adults appeared to be more driven by a desire to escape or relieve mood. The introduction of late-onset gamblers in the older age groups likely explains the desire for older adults to escape or relieve mood as late-life gambling largely serves to act as an escape from late-life emotional distress [18].

The results of this study found lower prevalence rates of mood, anxiety, and substance use disorders in older adults compared to other age groups. This lower prevalence of comorbid mental health conditions in older adults is consistent with the finding that gambling in older adults is less severe in terms of total symptoms endorsed, and similar to other studies that found earlier age of onset to be associated with greater comorbid disorder severity [39, 54, 63]. SAVI theory suggests that the relatively lower presence of comorbid mental disorders in older adult gamblers may be due to age-related improvements in well-being [19]. The current study examined gamblers meeting at least one DSM-5 disordered gambling criteria. A recent examination using the NESARC found older adults meeting at least four DSM-5 disordered gambling criteria were more likely than younger age groups to present with a comorbid psychiatric condition [20], suggesting more severe gamblers do not experience the age-related benefits proposed by the SAVI theory [19].

The development of late-onset gambling in older adults may be indicative of increasing vulnerability with age, including impaired health functioning as observed in this study. Some studies have suggested older adults may develop problem gambling behaviors later in life in part to cope with negative affect that may be related to the process of aging, including reduced social network and reduced physical capacity [65]. Alternatively, chronic gamblers may have learned how to control and manage their gambling issues over a long period of time, thereby limiting the presentation of gambling symptoms and co-occurring gambling issues, as observed in other addictions [66]. This study cannot directly address this issue directly because it is cross-sectional, and we did not differentiate between chronic gambling and late-onset gambling in older adults. However, our findings generally suggest that older adults, overall, present as a less severe gambling group than younger or middle age groups of gamblers. It is important to

note that this discrepancy in symptomatology may also be due, in part, to a lack of opportunity to meet these criteria given changes in employment and social relationships associated with old age, which have led some to call for gambling criteria designed specifically for older adults [67].

In young adults, comorbid prevalence rates, DSM-5 gambling disorder prevalence, and gambling severity as measured by number of diagnostic criteria met were all significantly greater than in the other two age groups. We found that younger adults were less likely to gamble to escape or relieve mood, which is similar to past research which has suggested that, despite experiencing gambling difficulties, young adults are often unlikely to acknowledge their gambling behaviors as problematic [68]. While prevention strategies and recommendations have been suggested to target adolescents and young adults [69-72], a review of adolescent gambling literature noted that it is unclear whether these programs impact problem gambling behaviors or prevalence [73].

Our hypothesis that age would moderate the relationship between quality of life and gambling severity was only supported for one of the eight health variables we examined; age moderated the relationship between social functioning and gambling severity. Among the younger and middle age gamblers, participants with poorer social functioning had the greatest gambling severity, whereas among older gamblers, this relationship was attenuated. This coincides with previous findings regarding early-onset gambling being associated with more severe symptomatology [63]. The moderating impact of age on the relationship between social functioning and gambling severity may become increasingly important to understand given the proliferation of online gambling opportunities, where young adults may be increasingly able to engage in harmful gambling behaviors without leaving the home or even being disqualified from gambling due to being under the age of majority. As previous research has found, younger problem gamblers differentiate from older gamblers in the frequency with which they gamble apart from family or friends and their overall involvement in non-gambling related extracurricular activities [62, 74]. For older adults, the relationship between lower social functioning and greater gambling severity was significant but weaker than in other age groups. This may suggest that some older adults simultaneously use gambling as a social interaction and experience a relatively high number of disordered gambling symptoms. Alternatively, older adult gamblers may have felt that their social activities were not interfered with by physical health or emotional problems if a chronic stressor had reduced their level of social support over a long period of time, as may occur in individuals with long-standing stressors according to the SAVI theory [19].

While previous research has found that psychological treatment targeted towards gambling improves other psychological symptoms, it should be noted that efficacious treatment options, including cognitive-behavioral therapy and motivational interviewing tend to include individualized feedback that takes overall symptomatology and gambling motives into account [75]. The results of the current study highlight the differing clinical presentation of individuals across the lifespan who meet at least one disordered gambling criterion. Specifically, the findings reinforce the importance of implementing treatment as soon as possible, particularly in young adults who present with greater severity and a higher prevalence of past-year comorbid disorders. Signs of problem gambling in older adults, alternatively, may be a sign of poorer general mental or physical functioning and should not be dismissed as a by-product of positive socialization.

Limitations

The current study has a number of substantial strengths, including the use of DSM diagnostic criteria for comorbid conditions, and recruiting gamblers from a nationally representative sample rather than looking exclusively at those seeking treatment. However, this study, particularly the use of Wave 1 of the NESARC, has limitations that should be noted. Wave 1 of the NESARC examined DSM-IV-TR diagnostic criteria for comorbid psychiatric disorders, such that our psychiatric comorbidity findings might not generalize to the DSM-5. While DSM-5 disordered gambling was replicable within the NESARC without impacting the integrity of the diagnosis, the other disorders are not as clear-cut. As a result, the findings of this study reflect the DSM-IV view of psychiatric disorders. The NESARC utilized trained-lay interviewers to conduct the AUDADIS-IV instead of mental health professionals. Although trained lay interviewers do not have the same training as professionals, they have been shown to perform similarly to medical doctors in diagnosing disorders with a structured interview [76]. Another limitation comes from the timeliness of this research. This study utilizes data from NESARC Wave 1, collected from 2001 to 2002. Despite the age of the data, the NESARC was chosen as it offers a nationally representative large sample of gamblers, allowing for generalizability across locales and settings, making it ideal for the purposes of this research question. Further, more recent waves of the NESARC did not survey gambling. The research utilized cross-sectional data and did not allow for differentiation between early- and late-onset gambling, limiting the ability to infer causality.

Since the time of data collection, disordered gambling rates may have changed with the proliferation of available gambling methods, specifically online gaming, including Internet poker, and video lottery terminals. These methods may be of particular interest to both younger adults with poor social functioning and older adults with poor physical functioning. Online gamblers may differ from non-online gamblers, though research is inconsistent in terms of differences in severity and symptomatology [75, 78, 79]. Online gamblers are thought to be less likely to seek treatment [78]. Therefore, it can be challenging to determine how psychiatric comorbidity rates in online gamblers may differ from those in more traditional gamblers [78, 80]. One study of outpatient pathological gamblers in Sweden found that 89% of treatment-seeking patients reported online gambling as the focus of their gambling problem, and 58% of patient records indicated an additional psychiatric diagnosis unrelated to gambling [81].

Conclusion

The current study found that gambling-related features differ across the lifespan in gamblers presenting with as few as one disordered gambling symptom. Mental and physical functioning, comorbid psychiatric disorders, and the disordered gambling symptoms among individuals with at least one disordered gambling criterion were all found to differ significantly among younger, middle-aged, and older adults, with older adults having poorer physical functioning but fewer past-year comorbid psychiatric conditions than other age groups. In general, age influenced the clinical features associated with gambling. Older adults who experience gambling symptoms may still benefit from age-related strengths that are associated with fewer comorbid mental health problems. Young adults with gambling symptoms may present as more severe and require intervention as soon as possible to help prevent future difficulties. Further, age moderates the relationship between social functioning and gambling severity, highlighting the importance of social factors, including connectivity and isolation, in the prevention and treatment of gambling issues across the lifespan.

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