

*Research article*

## **The Prevalence and Correlates of Gambling Participation among Community-Dwelling Chinese Older Adults in the U.S.**

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**Abstract:** This study aimed to examine the prevalence and correlates of gambling participation and problems among community-dwelling Chinese older adults in the U.S. Based on a community-based participatory research approach, the study enrolled 3,159 Chinese older adults aged 60 years and above in the greater Chicago area. Among the participants, 58.9% were women and the average age was 72.8 years. Overall, 467 older adults had engaged in gambling in the past twelve months and 65 older adults had experienced any risk of problem gambling. Visiting a casino was the most commonly reported type of gambling, whereas betting on Mahjong had the highest frequency. Being male, lower educational levels, higher income levels, having more children, living in the U.S. for a longer period of time, living in the community for a longer period of time, better health status, lower quality of life, and improved health over the past year were significantly correlated with any gambling in the past year. Younger age, being male, and living with more people were significantly correlated with experiencing any risk of problem gambling in the past year. Future studies should be conducted to better examine the health effects of gambling and problem gambling among Chinese older adults.

**Keywords:** gambling; Chinese older adults; culture; problem gambling

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### **1. Introduction**

Gambling takes place in various forms (e.g., lotteries, bingo, casinos, or card games) and can be categorized into different types, including social/recreational gambling and problem gambling. Due to increased social acceptability, accessibility, and legalization, gambling has become a highly visible form of recreation. In the field of public health, gambling has become a serious concern, as a growing number of studies have linked gambling to poorer health [1–3]. In particular, problem gambling, which is defined as the gambling behavior that causes disruption in any major area of

life [4], has been consistently shown to be associated with substance abuse [5], suicide attempts [3], and family violence [1].

Gambling is common among older adults, with 50.3% of U.S. adults aged 65 years and over reporting gambling in the past year, according to the Gambling Impact and Behavior Study [6]. Gambling motivation, behavior, and impacts among older adults may be different from that of younger adults [7]. Unlike younger adults who tend to participate in gambling activities for financial gains, older adults may consider gambling as a source of recreation, given an increased amount of free time after retirement [7]. In addition, older adults may participate in gambling to maintain cognitive function, escape age-related stressors, or get rid of boredom [6]. Further, in contrast to younger adults who may involve in multiple types of games at the same time, older adults tend to focus on limited types of gambling [8]. Differences in health impacts of gambling between older and younger age groups are also evident. According to a study comparing health correlates of gambling between younger adults and older adults, recreational gambling was associated with better self-reported general health among older adults, but such pattern of association was not observed among younger adults [6].

While gambling may have potential positive effects on older adults' health, recent studies demonstrate that older adults are at high risk for experiencing problem gambling. In a survey of 1,260 older residents aged 55 and older in Florida, 0.7% of the participants were problem gamblers and 3.7% were at-risk gamblers [9]. In another study of 343 adults aged 60 years and older, 6.4% of the participants were problem gamblers whose physical and mental health problems were significantly greater than that of the non-problem gamblers [10]. Older adults may be more susceptible to problem gambling than younger adults because they tend to have fixed income, reducing their likelihood of recovery after losing money gambling. Additionally, program gambling may exacerbate chronic medical conditions such as hypertension, liver disease, and arthritis, which are more common among older adults than in younger adults [11]. A better understanding of problem gambling among older adults is warranted to facilitate the development of effective gambling interventions.

Studies on gambling must take into account the cultural background of the gamblers. Cultural values and beliefs may influence older adults' attitude towards gambling, affect their gambling pattern and behavior, and guide their help-seeking behavior and service utilization [12]. Researchers have suggested that gambling is more prevalent in a society where people hold positive attitudes towards gambling than in where people condemn gambling participation [12]. Indeed, in Chinese society, gambling is deemed as a socially acceptable activity. In particular, social gambling is prevalent during festive seasons such as the Chinese New Year, and during gatherings, such as birthdays and weddings [13]. Superstitious beliefs may also contribute to the initiation and maintenance of gambling in Chinese culture [14]. Believing in the power of luck, Chinese may be more likely to engage in risk-taking activities such as gambling. Compared to other racial ethnic groups, Chinese adults have been shown to have a higher prevalence of gambling and greater levels of problem gambling and addiction [15]. A cross-cultural study of gambling among Arabic, Chinese, Greek, and Vietnamese adults in Australia found that Chinese had a disproportionate number of problem gamblers [16].

Although gambling may be socially acceptable in Chinese culture, losing control over gambling is not tolerated in Chinese society [17]. Problem gamblers in Chinese culture tend to be characterized as irresponsible and deceitful. Due to a fear of losing respect, Chinese gamblers may be reluctant to

admit their problems and seek treatments [13]. In addition, although problem gambling has been well recognized as a psychological disorder in Western culture, it remains difficult for Chinese to accept it as an illness that requires psychiatry treatments [18]. Even if problem gambling is perceived as an illness, Chinese may believe that disclosing psychological issues would not only bring shame to the problem gambler but also threaten family reputation, due to the social stigma attached to mental illness. Thus, to save “face” [19], Chinese gamblers may conceal the issue and bail out the problems by themselves, as opposed to seek professional help.

Immigration may affect the magnitude and severity of gambling to some extent. Gambling may be a way for immigrants to cope with external immigration stressors and to achieve a sense of belonging to the country of residence. It has also been postulated that leaving the home country to the U.S. is a gamble itself, and therefore immigrants are often risk-takers by nature and are perhaps more likely to engage in gambling [20]. Chinese older adults represent the largest segment of Asian American older adult population. In addition to acculturation stress and great health disparities, recent studies consistently demonstrate that U.S. community-dwelling Chinese older adults are at risk for a wide range of psychosocial issues [21–24], emphasizing the urgent need to improve understanding of the social and psychological well-being of this vulnerable population.

However, very few studies to date have been conducted to examine gambling participation and problems among Chinese immigrant older adults. To narrow the knowledge gap, this study aimed to: 1) describe the prevalence, frequency, and types of gambling participation and problems; and 2) explore the sociodemographic and health-related correlates of gambling and problem gambling among Chinese older adults in the U.S.

## **2. Methods**

### *2.1. Population and Settings*

The Population Study of Chinese Elderly in Chicago (PINE) is a community-engaged, population-based epidemiological study of Chinese older adults aged 60 and over in the greater Chicago area. Briefly, the purpose of the PINE study is to collect community-level data to examine the key social and cultural determinants of health and well-being among Chinese older adults in the U.S. [25]. The project was initiated by a synergistic community-academic collaboration among the Rush Institute for Healthy Aging, Northwestern University, and many community-based social services agencies and organizations throughout the greater Chicago area. The study was approved by the Institutional Review Board of the Rush University Medical Center.

In order to ensure study relevance to the well-being of the Chinese community and increase community participation, the PINE study implemented extensive culturally and linguistically appropriate community recruitment strategies strictly guided by a community-based participatory research (CBPR) approach. The formation of this community-academic partnership allowed us to develop appropriate research methodology in accordance with the local Chinese cultural context. The community advisory board (CAB) plays a pivotal role in providing insights and strategies for conducting research [26,27]. Board members were community stakeholders and residents enlisted through over twenty civic, health, social and advocacy groups, community centers and clinics in the city and suburbs of Chicago. The board works extensively with investigative team to develop and examine study instruments to ensure cultural sensitivity and appropriateness [28].

Over twenty social services agencies, community centers, health advocacy agencies, faith-based organizations, senior apartments and social clubs served as the basis of study recruitment sites. Several additional strategies were employed to encourage participation in the study and increase cultural and linguistic appropriateness of the study. Flyers and posters advertising the study were placed in the public spaces including restaurants, teahouses, and parks frequented by Chinese families. Due to the closely-knitted ethnic social network connecting the families of Chinese immigrants, over a third of PINE study participants learned about the project through family members, neighbors, acquaintance, or friends. The eligibility criteria for participation were: 1) age  $\geq$  60 years; 2) self identified as Chinese; and 3) community-dwelling older adults. Out of 3,542 eligible older adults responding to our multiple recruitment channels, 3,159 (91.9%) agreed to participate in the study

Our bilingual research team translated the scales into Chinese and back translated it into English. The translations were further scrutinized by investigators to ensure content and face validity. The participant signed a consent form approved by the Institutional Review Board of the Rush University Medical Center prior to the interview. Trained multicultural and multilingual interviewers conducted face-to-face home interviews with participants in their preferred language and dialects, such as English, Cantonese, Taishanese, Mandarin, or Teochew dialect. Data were collected using state-of-science innovative web-based software which recorded simultaneously in English, Chinese traditional and simplified characters. This transformative technological platform minimized any information that may have been “lost in translation”, thus providing deeper meaning to the data collected.

## 2.2. Measurement

### 2.2.1. Socio-demographics characteristics

Basic demographic information included age (in years), sex (female and male), education (years of education completed), personal income (0–\$4,999 per year, \$5,000–\$9,999 per year, \$10,000–\$14,999 per year, \$15,000–\$19,999 per year, or more than \$20,000 per year), marital status (married, separated, divorced, widowed, or never married), number of children and living arrangement (living alone, living with 1 person, living with 2–3 persons, or living with 4 or more persons). Number of years in the community and years in the U.S., and country of origin were also assessed in all participants.

### 2.2.2. Health-related characteristics

Overall health status was measured by “In general, how would you rate your health?” on a four-point scale (1 = poor, 2 = fair, 3 = good, 4 = very good). Quality of life was assessed by asking “In general, how would you rate your quality of life?” also on a four-point scale ranging from 1 = poor to 4 = very good. Health changes over the last year was measured by “Compared to one year ago, how would you rate your health now?” on a three-point scale (1 = worsened, 2 = same, 3 = improved).

### 2.2.3. Gambling frequency and types

We used the Modified South Oaks Gambling Screen (MSOGS) to assess the frequency and

types of gambling. Older adults were asked how often they played the following types of gambling: (1) purchase state lottery tickets; (2) bet money on Mahjong or card games; (3) bet money on sport games; (4) go to casino; (5) play slot machines or bet money on video poker. Answers ranged from 0 = “never” to 6 = “once per week.”

#### 2.2.4. Problem Gambling

Participants were first asked whether or not they had ever gambled in the past 12 months. Among those who had gambled in the past twelve months, the 9-item Problem Gambling Severity Index (PGSI), derived from the 31-item Canadian Problem Gambling Index (CPGI), was utilized to measure problem gambling [29]. Respondents indicated answers to each question on a four-point scale ranging from 0 = “never” to 3 = “almost always.” The total score ranges from 0 to 27, with a score of 0 indicating non-problem gambling and a score of  $\geq 1$  indicating any risk of problem gambling [29]. The PGSI has been validated among Chinese Americans and has good inter-rater reliability [30]. The standardized Cronbach’s alpha of PGSI in the PINE study was 0.81.

### 2.3. Data Analysis

Descriptive analyses were used to calculate the frequency of gambling activities and problems. Chi-square analysis was conducted to compare the socio-demographic and health-related characteristics of older adults who have participated in gambling in the past twelve months and those who have not. Fisher’s exact test was then conducted to compare the socio-demographic and health-related characteristics of gamblers with and without any risk of problem gambling. Pearson Correlation Coefficients and Spearman Coefficients were used to calculate the correlates of gambling and problem gambling. Statistical analysis was conducted, using SAS, Version 9.2 (SAS Institute, Inc, Cary, NC).

## 3. Results

### 3.1. Frequency of Different Types of Gambling Activities among Chinese Older Adults

In total, 3,159 older Chinese adults participated in the study, of which 58.9% were women and the average age was 72.8 years ( $SD = 8.3$ , range = 60–105). Overall, 467 (14.8%) older adults had engaged in gambling in the past twelve months. **Table 1** shows the frequencies of different types of gambling activities. Visiting a casino was the most commonly reported form of gambling activities. Betting on Mahjong or card games had the highest frequency, with 8.8% of the older adults betting once per week and 1.9% betting once per month.

### 3.2. Sociodemographic and Health-related Characteristics among Gamblers and Non-Gamblers

**Table 2** presents the sociodemographic and health-related characteristics of older adults who had engaged in gambling and those who had not in the past twelve months. Compared with older adults who had not gambled, older adults who had participated in gambling in the past twelve months were more likely to be male, with 0–6 educational levels, with an annual income level that

was higher than \$10,000, living in the U.S. for more than 20 years, living in the community for more than 20 years, having 3 or more children, having good or very good health status, perceiving fair quality of life, and reporting the same level of health as compared to that of last year.

**Table 1. Frequency and Types of Gambling among Chinese Older Adults.**

	Never, N (%)	Once per 2 years, N (%)	Once per 1 year, N (%)	Once per 6 months, N (%)	Once per 3 months, N (%)	Once per month, N (%)	Once per week, N (%)
1. State lottery tickets	2785 (88.6)	82 (2.6)	60 (1.9)	41 (1.3)	53 (1.7)	69 (2.2)	53 (1.7)
2. Mahjong or card games	2692 (85.7)	53 (1.7)	21 (0.7)	22 (0.7)	21 (0.7)	58 (1.9)	276 (8.8)
3. Sports games	3123 (99.4)	8 (0.3)	0 (0.0)	0 (0.0)	1 (0.03)	3 (0.1)	6 (0.2)
4. Casino	2671 (85.0)	181 (5.8)	62 (2.0)	0 (0.0)	38 (1.2)	70 (2.2)	120 (3.8)
5. Slot machines or bet money on video poker	2836 (90.3)	110 (3.5)	35 (1.1)	32 (1.0)	23 (0.7)	56 (1.8)	49 (1.6)

**Table 2. Sociodemographic characteristics between gamblers and non-gamblers.**

	Gamblers N = 467	Non-Gamblers N = 2,675	$\chi^2$	p-value
Age, N (%)				
60–64	111 (23.8)	568 (21.2)		
65–69	101 (21.6)	540 (20.2)		
70–74	83 (17.8)	522 (19.5)		
75–79	78 (16.7)	473 (17.7)		
80 and over	94 (20.1)	572 (21.4)	2.7	0.605
Gender, N (%)				
Female	236 (50.5)	1589 (59.4)		
Male	231 (49.5)	1086 (40.6)	12.8	< 0.001
Education (years), N (%)				
0–6	232 (49.8)	1135 (42.6)		
7–12	187 (40.1)	915 (34.3)		
13 and over	47 (10.1)	616 (23.1)	40.3	< 0.001
Income (USD), N (%)				
\$0–\$4,999	114 (24.5)	925 (34.9)		
\$5,000–\$9,999	266 (57.2)	1346 (50.8)		
\$10,000–\$14,999	55 (11.8)	255 (9.6)		
\$15,000–\$19,999	11 (2.4)	57 (2.2)		
\$20,000 and over	19 (4.1)	68 (2.6)	21.2	< 0.001
Marital Status, N (%)				
Married	326 (70)	1898 (71.1)		
Separated	12 (2.6)	45 (1.7)		

Divorced	17 (3.7)	56 (2.1)		
Widowed	107 (23)	659 (24.7)		
Never Married	4 (0.9)	12 (0.5)	7.7	0.104
Number of Children, N (%)				
0	20 (4.3)	108 (4)		
1–2	164 (35)	1104 (41.4)		
3 or more	282 (60.5)	1458 (54.6)	2	0.043
Living Arrangement, N (%)				
0	115 (24.6)	560 (21)		
1	181 (38.8)	1126 (42.1)		
2–3	80 (17.1)	399 (14.9)		
4 or more	91 (19.5)	589 (22)	6	0.110
Years in the U.S., N (%)				
0–10	58 (12.5)	784 (29.4)		
11–20	150 (32.3)	806 (30.3)		
21–30	123 (26.5)	640 (24)		
31 and more	133 (28.7)	434 (16.3)	77	< 0.001
Years in the Community, N (%)				
0–10	212 (45.7)	1588 (60)		
11–20	129 (27.8)	608 (23)		
21–30	80 (17.2)	306 (11.5)		
31 and more	43 (9.3)	166 (6.2)	33.6	< 0.001
Origin, N (%)				
China	423 (90.6)	2490 (93.1)		
Hong Kong and Macau	21 (4.5)	83 (3.1)		
Taiwan	5 (1.1)	37 (1.4)		
Other	18 (3.9)	65 (2.4)	6	0.114
Overall Health Status, N (%)				
Very good	17 (3.6)	122 (4.6)		
Good	194 (41.5)	897 (33.5)		
Fair	192 (41.1)	1124 (42)		
Poor	64 (13.7)	532 (19.9)	16.2	< 0.001
Quality of Life, N (%)				
Very good	18 (3.9)	196 (7.3)		
Good	193 (41.3)	1186 (44.4)		
Fair	248 (53.1)	1198 (44.8)		
Poor	8 (1.7)	93 (3.4)	17.7	< 0.001
Health Changes Over the Last Year, N (%)				
Improved	37 (8.0)	238 (8.9)		
Same	253 (54.0)	1276 (47.7)		
Worsened	177 (38.0)	1159 (43.4)	6.6	0.037

### 3.3. Gambling Problems among U.S. Chinese Older Adults

Among older adults who had participated in gambling in the past twelve months, 65 (13.9%) had experienced any risk of problem gambling. **Table 3** presents the prevalence of each item of the PGSI among the participants. Of those who had participated in gambling in the past twelve months, 8.8% had been criticized about their gambling or been told that they had a gamble problem and 6.9% had gone back another day to try to win back money, representing the first two common gambling problems. Compared with older adults without any risk of problem gambling, those with any problem gambling risks were more likely to be male, with an annual income less than \$5,000, and with worsening health over the past year.

**Table 3. Problem Gambling Severity Index (PGSI).**

	Never, N (%)	Sometimes, N (%)	Most of the time, N (%)	Almost Always, N (%)
1. Have you bet more than you could really afford to lose?	463 (99.1)	3 (0.6)	1 (0.2)	0 (0.0)
2. Have you needed to gamble with larger amounts of money to get the same feeling of excitement?	458 (98.1)	8 (1.7)	1 (0.2)	0 (0.0)
3. When you gambled, did you go back another day to try to win back the money you lost?	435 (93.2)	20 (4.3)	5 (1.1)	7 (1.5)
4. Have you borrowed money or sold anything to get money to gamble?	463 (99.1)	3 (0.6)	1 (0.2)	0 (0.0)
5. Have you felt that you might have a problem with gambling?	447 (95.7)	15 (3.2)	2 (0.4)	3 (0.6)
6. Has gambling caused you any health problems, including stress and or anxiety?	450 (96.4)	11 (2.4)	4 (0.9)	2 (0.4)
7. Have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?	425 (91.2)	20 (4.3)	8 (1.7)	13 (2.8)
8. Has your gambling caused any financial problems for you or your household?	456 (97.6)	6 (1.3)	2 (0.4)	3 (0.6)
9. Have you felt guilty about the way you gamble or what happens when you gamble?	447 (95.7)	12 (2.6)	4 (0.9)	4 (0.9)

### 3.4. Correlates of Gambling Participation and Problems among Chinese Older Adults

Correlates of gambling and problem gambling are presented in **Table 4**. Being male ( $r = 0.06$ ,  $p < 0.001$ ), lower educational levels ( $r = 0.08$ ,  $p < 0.001$ ), higher income levels ( $r = 0.06$ ,  $p < 0.01$ ), having more children ( $r = 0.05$ ,  $p < 0.01$ ), living in the U.S. for a longer period of time ( $r = 0.16$ ,  $p < 0.001$ ), living in the community for a longer period of time ( $r = 0.10$ ,  $p < 0.001$ ), better health status ( $r = 0.05$ ,  $p < 0.01$ ), lower quality of life ( $r = 0.04$ ,  $p < 0.05$ ), and improved health over the past year ( $r = 0.04$ ,  $p < 0.05$ ) were significantly correlated with any gambling in the past year.

On the other hand, younger age ( $r = 0.09$ ,  $p < 0.05$ ), being male ( $r = 0.23$ ,  $p < 0.001$ ), and living with more people ( $r = 0.11$ ,  $p < 0.05$ ) were significantly correlated with a higher levels of experiencing any risk of problem gambling in the past year.



**Table 4. Correlations of Gambling and Gambling related Problems among U.S. Chinese Older Adults.**

	Age	Sex	Edu	Income	MS	Living	Children	Yrs in U.S.	Yrs in com	Origin	OHS	QOL	HC	Gambling	PG
Age	1.0														
Sex	0.01	1.0													
Edu	-0.12***	-0.21***	1.0												
Income	0.05**	0.00	0.01	1.0											
MS	-0.33***	-0.32***	0.22	-0.03	1.0										
Living	-0.35***	-0.07***	0.02	0.16***	0.24 ***	1.0									
Children	0.32***	0.09 ***	-0.38***	0.00	-0.13***	-0.07***	1.0								
Yrs in U.S.	0.35 ***	0.03	-0.10***	0.35***	-0.2***	-0.31***	0.15***	1.0							
Yrs in com	0.23 ***	0.02	-0.11***	0.24***	-0.13***	-0.18***	0.10 ***	0.66***	1.0						
Origin	0.04*	-0.01	-0.08***	-0.20	0.05 **	0.05**	0.04*	-0.2***	-0.15***	1.0					
OHS	-0.08***	-0.06 **	0.06***	0.12***	0.05**	-0.00	-0.00	-0.01	0.05*	-0.03	1.0				
QOL	0.06***	0.05**	0.09***	0.08***	0.03	-0.01	0.04*	0.00	-0.02	-0.04*	0.32***	1.0			
HC	-0.11***	-0.03	0.02	0.05**	0.07***	0.01	-0.02	-0.04*	0.03	0.00	0.35***	0.15***	1.0		
Gambling	-0.03	-0.06***	-0.08***	0.06**	-0.01	-0.01	0.05**	0.16***	0.10***	-0.03	0.05**	-0.04*	0.04*	1.00	
PG	-0.09*	-0.23***	0.04	-0.06	0.05	0.11*	-0.06	-0.02	-0.00	0.07	-0.05	-0.09	0.03	1.00	1.00

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$

Notes: Edu = Education; Children = Number of Children; MS = Marital Status; Living = Living Arrangement; Yrs in U.S. = Years in the US; Yrs in com = Years in the Community; Origin = Country of Origin; OHS = Overall Health Status; QOL = Quality of Life; HC = Health Changes over the Last Year; PG = any gambling related problems

#### 4. Discussion

As one of the largest epidemiology study examining social and psychological well-being among Chinese older adults, this study sheds light on gambling participation and problem gambling among Chinese older adults in the U.S. The study demonstrated that visiting a casino was the most common gambling activity among Chinese older adults, whereas betting money on Mahjong or card games had the highest frequency. Being male, lower educational levels, higher income levels, having more children, living in the U.S. for a longer period of time, living in the community for a longer period of time, better health status, lower quality of life, and improved health over the past year were significantly correlated with participating in gambling in the past twelve months. Younger age, being male, and living with more people were correlated with experiencing any risk of problem gambling. .

In this study, 14.8% of the older adults had participated in gambling in the past twelve months. Surprisingly, the prevalence of gambling participation in Chinese older adults was lower than that of other racial/ethnic groups. In a random sample of 810 older adults aged 55 years and older in Canada, 47.5% had gambled in the past year [31]. In a study of 1,512 older adults aged 62 and above in Oregon, 58.2% reported gambling in the past twelve months [32]. We suspect that because of cultural influences, many of Chinese older adults, especially new immigrants, may be unfamiliar with traditional gambling activities (e.g., bingo) that are popular among U.S. older adults. Due to limited gambling options, immigrant older adults were less likely to involve in gambling in the past year. The comparison of prevalence figures of gambling across different racial/ethnic groups should be interpreted cautiously because of differences in research methodologies and settings among studies.

Visiting a casino was the most commonly reported gambling activity among Chinese older adults. This may be due to the marketing strategies employed by casinos, such as free transportation, cheap buffets, gambling coupons, and other discounts. U.S. Chinese older adults often confront transportation and language barriers when seeking social activities, but the free bus ride and the bilingual staff offered by the casinos may address older adults' concerns and enhance their motivation for visiting the casino. On the other hand, betting on Mahjong or card games was the most frequent gambling activity. Mahjong is also reported to be a predominate form of gambling activities among 2,272 Chinese older adults aged 55 years and older in Canada [33]. As a culturally specific form of gambling, Mahjong, is originated from China and has become a wide spread form of gambling in Chinese society; it is often played by four people who are always families, friends, and neighbors. Playing Mahjong provides older adults opportunities to interact with family members and friends, while at the same time, may give rise to conflicts and disputes among the gamblers and affect older adults' social relationship. Given the high frequency of playing Mahjong or card games among older adults, future studies should explore the health outcomes of playing Mahjong.

In this study, older Chinese men were more likely to report gambling in the past twelve months than women. The finding is in contrast to a study of 2,768 U.S. adults aged 63 years and over, which found that the percentage of female gamblers was higher than that of male gamblers [34]. We suspect that compared with women, men may have a wider scope of gambling options, increasing their likelihood of gambling. In addition, exiting social activities for women may be more diverse than that for men. Many older Chinese women have involved in community social activities such as dancing and singing, which are less likely to attract men. Gambling may therefore become the main outlet for social engagement in older men due to a lack of diverse social activities.

Interestingly, living in the U.S. for a longer period of time was associated with increased gambling participation among the participants. Older adults who have been in the U.S. longer tend to be more familiar with the available gambling resources, and thus are more likely to engage in gambling activities. In addition, older adults who live in the U.S. for a longer period of time may have higher financial stability, thereby increasing their likelihoods of gambling. This finding is consistent with a study of gambling participation among Mexican immigrants in New York City, which found that immigrants who had lived in the U.S. longer were more likely to report gambling [35]. Another intriguing finding was that better health status and improved health over the past year were correlated with increased gambling participation. Gambling may improve immigrant older adults' health status through increasing social engagement and reducing loneliness. However, it should be mentioned that, due to the cross-sectional nature of the present study, we were unable to determine the causal relationship between gambling and health. It may be that healthier older adults were more active in social activities, and therefore were more likely to participate in gambling. Future studies are needed to elucidate the mechanisms through which gambling links with health status,

With respect to problem gambling, the study demonstrated being criticized is the most frequently endorsed gambling problem, followed by going back to win money. This finding is consistent with a study of older adults in Ontario, which found that being criticized by others and going back to win money were commonly reported gambling problems [36]. In Asian culture, chasing losses can be seen as a way of blocking shame. Asians believe that they could lose the respect of family and peers and think it is their responsibility to take control over their gambling issues [16,37]. This could explain why they would perhaps go back another day to try to win back the money that they lost, rather than confront the issue, with support from family members. When comparing the socioeconomic profiles of problem gamblers and non-problem gamblers, we found that older adults at risk for problem gambling had a higher percentage of whom with an annual income level lower than \$5,000 than the non-problem gamblers. In a telephone interview of 1,121 adults aged 15 to 64 years in Macao, China, adults with lower income reported a significant higher risk for problem and pathological gambling [38]. Older adults with lower income may be less capable of recovering losses, and thus are more likely to feel guilty by losing money gambling or be criticized by gambling.

While this study has improved our understanding of gambling among Chinese older adults, interpretations of the findings should consider limitations. First, because this study only examined selective types of gambling activities; there may be other gambling activities that have not been captured by the measure. Second, this study was designed as a descriptive study, which may be subject to statistical limitations. Future studies should conduct more rigorous analysis to delineate the association between gambling and physical and mental health among Chinese older adults. Third, due to cultural stigma on problem gambling and the use of self-report approach, there may be reporting bias in the present study. However, the utilization of the community-based participatory research approach may improve the trust of the participants and the research assistants, and thus help reduce potential reporting bias. Fourth, this study employed a cross-sectional design, and we were unable to make causal inferences. Future longitudinal studies are required to better examine factors associated with problem gambling. Finally, the study was conducted among Chinese older adults in the greater Chicago area, and therefore our findings may not be generalizable to Chinese aging populations in other areas.

Despite the limitations, this study has important research and policy implications. Research should continue to explore factors associated with gambling and problem gambling among Chinese older adults so as to facilitate the development of gambling prevention and intervention programs. Community organizations should improve the availability of community-based cultural competent mental health services for older adults at risk for program gambling; they should also increase education and awareness of problem gambling among older adults and their family members, especially among male and younger adults.

## 5. Conclusion

This study found that 14.8% of the older adults had participated in gambling in the past twelve months, and more than one in ten gamblers had experienced any risk of problem gambling. Visiting a casino was the most commonly reported type of gambling and playing Mahjong was the most frequent gambling activity. Gambling participation and problems were correlated with various socio-demographic and health related characteristics. Future longitudinal studies are warranted to better explore factors associated with gambling and problem gambling among Chinese older adults in the U.S.

## Conflict of interest

The authors declare no conflict of interest.

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