

## Youth gambling in Hong Kong: Prevalence, psychosocial correlates and prevention

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### Abstract

**Purpose:** Youth gambling has long been considered a risk behavior and public health concern. Compared to Western literature, empirical studies on youth gambling in Hong Kong are scarce. The present review paper aims to provide an overall picture about the prevalence rates and psychosocial correlates of Hong Kong young people's gambling behaviors, as well as existing prevention/intervention measures.

**Methods:** We searched literature in four major databases (PubMed, Sociological Abstracts, PsycINFO, and Web of Science), government documents and commissioned research reports. A total of 28 published papers on youth gambling in Hong Kong were identified and reviewed.

**Results:** The results showed that a high percentage of Hong Kong youth involved in gambling activities and the prevalence rate of problem/pathological gambling was comparable to the global findings. Risk factors at individual, family and peer, and environmental levels were identified which provide useful information for the development of prevention strategies targeting youth gambling. While intervention and prevention services are available in Hong Kong, programmes specifically designed for young people are limited.

**Conclusion:** The findings suggest that there is a need to conduct longitudinal studies based a more representative sample of adolescents in Hong Kong with consistent measures and cut-off criterion.

**Implications and Contribution:** The present review supports that positive youth development approach may represent a promising direction in the prevention of youth

gambling. Well-designed evaluation studies should be further carried out to examine the effectiveness of different prevention/intervention strategies.

**Keywords:** Youth gambling, prevalence, risk factors, prevention, Hong Kong

## **Introduction**

Gambling is a popular recreation, but it could be addictive and lead to serious consequences, especially for young people [1-3]. Researchers have reported high rates of gambling involvement and problem gambling behaviors among youth worldwide [4-7]. There is also a positive relationship between earlier onset of gambling and problem gambling severity [8]. With the rapid advancements in digital technology, gambling is getting more accessible to the young generation through the use of the Internet or mobile phone applications in the past two decades. A recent review [9] found that 0.2% to 12.3% of youth aged between 10 and 24 met the criteria of problem gambling, and Internet gambling was a significant predictor. Based on a meta-analysis of 72 studies conducted between 1987 and 2016, Nowak [10] estimated that 6.13% of college students can be classified as probable pathological gamblers and 10.23% as problem gamblers [10]. All these findings suggest that youth problem gambling is a significant global public health issue which requires more efforts from both researchers and practitioners.

In Hong Kong, gambling has been traditionally regarded as an acceptable leisure activity. The Hong Kong Jockey Club (HKJC) is the largest government-authorized institution which provides most legalized gambling activities, including betting on horse racing, the Mark Six lottery, and oversea football events. Other organized gambling offered by non-authorized institutions are all illegal. Similar to other countries, the legal minimum age for gambling is 18 in Hong Kong. However, adolescents are generally acceptable to

participate in social gambling such as poker, mah-jong during family reunion or cultural festivals like Chinese New Year [3]. It is also not uncommon that children and adolescents participate in legalized gambling activities, such as purchasing lottery or scratch tickets, with the presence of adult family members. Indeed, gambling as a social activity is different from the mainstream western society [11,12].

According to the Census and Statistics Department of Hong Kong Government [13], in the ten years between 2006 and 2016, the bets and sweeps tax rose from HK\$12,047 million to HK\$20,127 million, indicating an increased amount of money spent by people in gambling activities. Realizing the potential harm of problem gambling and its prevalence rate among the public, the Hong Kong Special Administration Region (HKSAR) Government has commissioned different universities to carry out a series of studies since 2001, in order to evaluate and monitor Hong Kong people's participation in gambling activities. Several rigorously designed large-scale survey research have been conducted to investigate gambling behaviors in both the general population and young people. However, with few exceptions [14-16], the findings were seldom reported in International journals and thus were not included in published systematic review and meta-analysis studies focusing on global youth gambling problems. For example, only one study [17] was included in Calado et al.'s [9] review paper on the prevalence of adolescent problem gambling. Similarly, Blinn-Pike, Worthy, and Jonkman [18] identified 137 articles published between 1985 and 2010 that examined gambling among youth aged between 9 and 21 years, and none of the identified studies was from Hong Kong. In order to provide an updated and overall picture about this issue in Hong Kong, the present paper aims to review and synthesize literature focusing on Hong Kong youth's gambling involvement and problems in terms of the prevalence rates, psychosocial correlates, and existing gambling prevention and intervention programmes.

Specifically, several terms used in the present review were defined first. “Youth” in this review refers to individuals between ages 10 and 24 years, corresponding to WHO’s definition of young people. For the term “gambling”, Ladouceur et al’s [19] definition was adopted, which defined gambling as “an activity that implies an element of risk, and that money, or something of sentimental or monetary value, could be won or lost by the participants”. Moreover, there are various labels in the literature describing gambling problems, such as problem gambling, at risk gambling, pathological gambling, and gambling disorder, which are often used to reflect different severity levels of the problems. In the present review, we use the terms adopted by the original authors of the study when describing the related findings, along with reporting the assessment tools and diagnostic criteria employed in the study. Studies that focused on non-problematic gambling among young people in Hong Kong were also sought in this review.

## **Methodology**

### *Search strategy*

Between June and July 2017, a literature search was conducted using four databases: PubMed, Sociological Abstracts, PsycINFO, and Web of Science. The search terms and their derivatives included: “gambl\*”, “youth”, “adolescen\*”, “teen\*”, “child\*”, “student”, “prevalence”, “prevent\*”, “intervent\*”, “treat\*”, “therap\*”, “Hong Kong”, and “Chinese”. In addition, government documents and commissioned research reports were included in the review for relevant studies.

### *Selection criteria*

Given the limited literature on the topic, less restrictive inclusion criteria were adopted in the present review. Studies were selected based on the following inclusion criteria.

The research had to (1) report on quantitative empirical data; (2) provide a full-text article/report; (3) have been published after 2000; and (4) sample young people between the ages of 10 and 24 years in Hong Kong. Studies were excluded if they (1) were in languages other than English; or (2) only reported qualitative data; or (3) only focused on parents or families of adolescent gamblers; or (4) reported on non-empirical data. For all identified studies, sampling method, type of prevalence reported, diagnostic criterion for the measurement of gambling problems, and methods used to evaluate the prevention/intervention programmes were carefully recorded, although no specific relevant inclusion or exclusion criterion were applied in literature search.

## **Results**

The original search yielded 67 references, of which 46 were retained for review based on a thorough inspection of the title and abstract of the papers. The two authors assessed all 46 articles with the inclusion and exclusion criteria. First, identified duplicates were removed ( $n = 6$ ). Second, articles with no full text in English, no quantitative empirical data, and based on participants aged 25 years or above, or living in other Chinese societies were excluded ( $n = 21$ ). These criteria led to the retention of 19 articles. Through searching the citations in the articles identified, another 9 studies were included in the review. Figure 1 shows a diagrammatic representation of the search strategy.

### *Prevalence of youth gambling in Hong Kong*

The first large-scale study on Hong Kong people's participation in gambling activities was conducted in 2001 by The Hong Kong Polytechnic University [20], which included a cluster sample of 2,000 students aged 13 to 17 [20]. This is also the first of the HKSAR government-commissioned studies on gambling. It was revealed that, in the *past year* of the

survey, 49.2% of the adolescents participated in social gambling, 19.4% and 9.2% were involved in buying Mark Six (a lottery betting in Hong Kong, which is similar to Powerball and Mega Millions) and horse racing, respectively, 5.7% participated in soccer betting, 4.6% had Internet betting, and 3.9% were involved in other ball games gambling. A Chinese version of DSM-IV-based questionnaire was used for both adult and adolescent populations (Cronbach's alpha = 0.75) to identify pathological gambling with a cut-off score of five. Scores of three or four out of ten indicate problem gambling. The findings showed that 2.6% of the adolescents could be classified as having probable pathological gambling, and 4.5% as probable problem gambler, which were higher than the rates of the adult sample (1.85% pathological gambler and 4% problem gambler). Besides, male adolescents participated more actively than females in gambling activities, but gender difference in pathological gambling among youth was not reported. It should be noted that the adult survey was conducted through telephone interview while youth survey was administered in the form of self-report questionnaire.

Another youth survey on gambling behavior was carried out between March and April, 2005 [21]. Based on a multistage cluster sampling, a total of 1,496 secondary school students aged 12-19 participated in the study by completing a self-administered questionnaire, among which 34.0% reported that they participated in gambling activities *last year*. The most popular gambling activities in adolescents were social gambling (24.5%), Mark Six lottery (15%), and football betting (6.8%) with HKJC. Based on DSM-IV, 1.3% of respondents were classified as "probable pathological gamblers", and another 1.3% of respondents met the criteria of "probable problem gamblers". Compared to the results in 2001, it appeared that in 2005 the overall prevalence rates of gambling participation (social gambling and Mark Six lottery betting), problem gambling, and pathological gambling among adolescents decreased.

In 2008, considering the rapid growth of gaming industries in districts around Hong Kong, an evaluative study on the impacts of such gambling liberalization in nearby cities on Hong Kong people's gambling participation was carried out [22]. Telephone interview was conducted with 2,088 randomly sampled Hong Kong citizens aged at 15 or above. Among the adolescents (aged 15-19), the *past year prevalence* rates of probable problem gambler and probable pathological gambler were 9.7% and 5.2%, respectively. In particular, about 17% of them reported that they had participated in Mark Six lottery betting (most popular activity) in the past year.

Adopting a similar methodology, another survey comprising 3,982 adolescents aged 15 to 18 was conducted in 2011 [23]. The study showed that 40.4% of the respondents had participated in gambling in their *lifetime*; 3.0% of the participants can be classified as probable problem gamblers, and 1.5% as probable pathological gamblers, both of which increased slightly as compared to the findings obtained in 2005, while decreased as compared to the rates in 2008. The most popular gambling activity that adolescent participated in the past year remained social gambling (47.3%), followed by Mark Six lottery betting (15.2%) and football betting (4.7%). Worth noting is that 12.9% of respondents reported their participation in illegal gambling activities in the past year, including 8.7% of respondents who participated in Internet gambling. Among adolescents who gambled in the last year, most of them were accompanied by friends/classmates (64.6%) and family members (54.6%), gambled in home residence (62.9%), and obtained money for placing bets from family members (72.3%). Being male, low family income, and poor academic performance were found predictive of the risk of being pathological and problem gamblers.

The most recent survey on adolescent gambling in Hong Kong was conducted in 2016 [24], based on a cluster sample of 3,318 participants aged 15 to 22. Participants included 2,120 secondary school students (aged 15 to 18), and 1,198 students and working youth from

vocational training council (aged 19-22). The prevalence rates of gambling participation in the past year were 30.4% for the whole sample. Social gambling (23.5%), Mark Six lottery betting (15.9%), and football betting (4.3%) remained the most popular gambling activities among all participants who gambled in the past year and the prevalence rate of online gambling was found 1.4%. Different from previous studies which adopted the DSM-IV criteria, the DSM-V criterion of Gambling Disorder was used in this survey, which classifies individuals who displayed four or more of nine listed behaviors as having gambling disorder. No differentiation was made between problem and pathological gambling. Based on the new criterion, the prevalence rate of gambling disorder was 1.6% for the whole sample. Among participants who indicated that they gambled in the past year, the prevalence rate of gambling disorder in the students and working youth from vocational training council (7.2%) was significantly higher than secondary school students (4.1%). Boys also had higher rates of gambling disorder (9.0%) than girls (2.5%).

Apart from the above Government-commissioned studies, several large-scale projects have been carried out by different research teams. The reported prevalence rates of gambling involvements and problem/pathological gambling varied across studies. Based on a stratified random sample involved 3,668 Chinese youth (aged 14-17) conducted by the Chinese University of Hong Kong, Cheung [14] reported that the prevalence of past-year gambling involvement was 24%. Furthermore, she found that gambling pathology and frequency were associated with other risk behaviors including tobacco use, alcohol use, and delinquency. In the same year, another school-based survey comprised a cluster sample of 926 high school students aged 12 to 20 years was conducted and yielded somehow different results: 46.5% of participants reported gambling in the previous 12 months, and 0.9% and 3.3% of the respondents could be identified as probable pathological gamblers and probable problem gamblers, respectively[17].



With specific reference to Internet gambling, Wong and So [25] administered the DSM-IV multiple response format for juveniles (DSM-IV-MR-J) on 1,004 Hong Kong adolescents aged 12-19 in 2010. They found that 3.5% of the participants reported Internet gambling and 63.5% participated in land-based gambling. Both offshore and online gambling prevalence rates in this study were higher than findings reported in the Government-commissioned study in the same year. It is worth noting that online gamblers were found 3.2 and 1.5 times more likely than non-Internet gamblers to develop at-risk and pathological gambling, suggesting that online gambling may be more addictive to adolescents than land-based gambling. In a more recent study comprised 2,775 secondary school students aged 12 to 17, Ho [3] reported that 43.6% of the respondents had participated in gambling activities in the past year. It was further revealed that among these adolescents, males had higher percentages (52%) than females (47.9%); 2.0% can be identified as problem gamblers and 1.8% as pathological gamblers, and Internet gambling has become the second popular gambling activity (58.5%), following after social gambling (Mah-jong and Poker). Different from Wong and So's findings [25], Internet gambling didn't predict problem and pathological gambling in this study.

Table 1 further summarizes the prevalence rates of youth gambling in Hong Kong reported by different researchers. Several observations can be made from the above review. First, the percentage of adolescents involved in gambling activities is generally high, with the reported prevalence rate ranged from 28% to 70%, and males being more likely to engage in gambling activities than did females. Second, a small but significant percentage of adolescents had problem gambling (1.3%-4.5%) or pathological gambling (1.3%-3.3%). The prevalence rates were comparable to those of other areas in the world [9]. Third, the prevalence rates of youth problem/pathological gambling across years fluctuated and inconsistent findings were reported (e.g., [15,17,18,20,21]). This may be due to the

inconsistent assessment tools and cut-off scores employed by different researchers. For example, DSM-IV adult version, DSM-IV-MR-J, and DSM-V were used in various studies; some researchers adopted a cut-off of 5 [15], while others used 4 [14]. Besides, in a few studies, the participants had a large age range (e.g., from 12 to 23 years [14]), while no description was provided on whether different measurement tools and cut-off criteria were applied to make diagnosis for junior and senior youth, respectively. If the same assessment tool and diagnostic criteria were used for the whole sample, the reported prevalence rate may be inaccurate.

Fourth, with few exception [12], the majority study focused on secondary school students based on cluster sampling instead of random sampling. Adolescents who are not studying in schools at the time of survey were underrepresented. In fact, there are studies showing that marginal youth are more likely to become a pathological gambler [26]. This population including those “hidden youth” should be focused in future studies. Fifth, the above studies primarily adopted a cross-sectional design. Although a series of research were conducted over years on large samples of people in different age groups, they were based on different samples and therefore can only provide an indirect picture about the developmental trajectory of gambling behaviors across life span. To understand how problem and pathological gambling behavior may change with age and the associated factors at different developmental stages, longitudinal studies would be needed.

#### *Psychosocial correlates of youth gambling in Hong Kong*

Most studies on youth gambling have been conducted in western countries. Research on gambling in non-western contexts, especially with regard to Hong Kong Chinese adolescents, is severely limited. In the following section, the correlates and consequences of

Chinese youth gambling were discussed. Overall, the factors can be categorized into three levels: individual factors, family and peer influences, and environmental characteristics.

*Individual factors* Studies have consistently shown that gender plays an important role in predicting adolescents' gambling. Male adolescents are more likely to engage in gambling [3,27,28], higher gambling frequency [1], and a greater involvement in online gambling activities [25] than female adolescents. Consistent with the international literature (e.g., [28]), studies based on Hong Kong adolescent also found that boys are more vulnerable to be classified as problem or pathological gamblers than girls [17,25]. Boys were more likely than girls to engage in online gambling, horse racing, and football betting [17]. Yet, no gender difference was found in Mark Six lottery betting and social gambling [24].

Age has been found to be associated with the prevalence of both offline and online gambling [24], problem gambling [25], pathological gambling [14]. In particular, regardless of the type of activity, the past year prevalence of gambling among older adolescents was higher than their younger counterparts [24]. Yet, findings on the age of onset of gambling have been mixed [21,23,24]. Using gambling disorder as the criterion variable, horse racing, online gambling, casino wagering were associated with an increase in the likelihood of gambling disorders when controlling the effects of age and gender [24].

In addition to demographic factors, differences in gambling motivations across types of gambling activities and gambling severity have been shown in the review studies. Several research based on representative samples of high school students ( $N > 2,000$ ) found that entertainment, excitement seeking, winning money, social gathering were the most common reasons for gambling [21,23,24].) Adolescent gamblers, who involved in horse racing and football betting, were likely to gamble for monetary motives and were also more likely to be classified as problem gamblers and pathological gamblers [20,24]. Such findings are different

from the western findings in which youth problem gamblers mostly participated in scratch cards, slot machines, card games and lotteries [29,30,31]. In general, while studies done so far focus on the relationship between gambling motivation and types of gambling, little is known about how gambling motivation is related to demographic characteristics or behavioral consequences.

Another area of investigation is the psychological correlates of adolescent gambling. In a study with a sample 2,775 high school students (aged 12 to 17), Ho et al. [3] used the Chinese version of DSM-IV to assess gambling severity and found significant associations among being pathological gamblers, playing poker, and other problem behaviors, such as smoking, truancy, and shoplifting. In addition, consistent with the western literature [32,33], problem gamblers and pathological gamblers had significantly lower level of self-esteem than non-gamblers and non-problem gamblers.

Another study was conducted by Yu et al. [16] among 801 students (aged 14-23) from seven Hong Kong local high schools. In line with western findings [34,35,36], cognitive bias has been linked to pathological gambling. Regression results showed that illusion of control with large effect size ( $>.70$ ) was the strongest predictor of pathological gambling.

A study carried out by Cheung [14] with 4,734 adolescents aged 12-23 found that male gender, older adolescents, lower socio-economic status, single-parent family were associated with problem/pathological gambling. In particular, adolescent pathological gamblers, who reported low self-control, were likely to engage in other problem behaviors, such as smoking, drinking and delinquency.

A correlation study on online gambling was carried out by Wong and So [25]. Among 1,004 students aged 12-19 years, online gamblers were likely to be male (90%), junior graders (60%), and wagered at home (90%). Online gamblers had higher odds of being at-

risk gamblers (1.5 times) and pathological gamblers (3.2 times) compared to offline gamblers.

*Family and peer influences* Based on a sample of 926 students (12 to 20 years old), Hsu et al. [17] examined the effects of parental gambling problems on adolescent gambling behavior and mental health. At-risk (2.3%) and pathological (.8%) gamblers were predominantly boys. About 67.1% of adolescents reported that their parents had gambled in the past 12 months, and yet, only 16.7% perceived their parents having a gambling problem. Parental problem gambling was positively related to their children's gambling problem, mental health (i.e., depression, anxiety and stress) and negatively associated with perceived family support. The effect of parental gambling appears to be more prevalent among male adolescents and consistent with past research [37,38].

A recent territory-wide survey conducted on a sample of students ( $N = 3,318$ ) found that older adolescents (aged 19-22) were likely to place bets through family and friends; whereas young adolescents (aged 15-18) preferred to place bets through family [24]. In particular, family/friend is the major source of betting money among young adolescents (31.2%) compared to older adolescents (15.0%). A noteworthy aspect was that these patterns were similar across types of gambling activities, such as Mark Six lottery, horsing racing and football betting [21].

Compared to western studies [39,40], relatively fewer investigations have tested the relationship between peer delinquency on gambling frequency and severity among adolescents. Cheung [14] found that at-risk/probable pathological gamblers were likely to be older adolescents, male gender, and associated with delinquent peers.

*Environmental characteristics* The prevalence of gambling advertisement has been investigated in a study based on a sample of 2,095 students (aged 12-19) [21]. Results showed that older adolescents (aged 16-19) reported they had accessed gambling information easily, showed favorable attitudes toward gambling, and admitted to gamble after viewing gambling advertisements compared to young adolescents (aged 12-15). Such findings are consistent to past studies demonstrated the impact of gambling advertisement on older adolescents, especially males [41].

#### *Prevention and intervention programs for youth gambling in Hong Kong*

In the literature, prevention measures for problem gambling can be classified into three levels based on different target populations [42]: 1) universal prevention, which aims to reduce the probability of a problem behavior in the general population, 2) selective prevention, targeting subpopulations at higher-than-average risk for the problem behavior, and 3) indicated prevention, which targets individuals with identified high risk for the behavior before it appears. In a conceptual review, Shek and Lee [43] summarized that there are two major approaches that guide the development of prevention/intervention programs on youth problem gambling. The first one is from the perspective of prevention science that focuses on the identified risk factors associated with problem gambling [44]. For example, practitioners may use the Chinese version of G-MAP, a classic assessment tool that evaluate risk factors of problem gambling in ten domains [45], to help design prevention/intervention strategies. The second is from the perspective of a positive youth development approach, which aims to prevent youth problems by focusing on promoting the strengths, interests and potentials of adolescents. An example is the Project P.A.T.H.S. which has been designed to promote holistic development among junior secondary school students in Hong Kong through providing curriculum-based training on 15 positive youth development constructs [46,47].

Different evaluation findings have supported the effectiveness of the Project P.A.T.H.S. in reducing participants' problem behaviors, including their intention to gamble in the next two years [48,49]. While the first approach is commonly adopted in selective and indicated prevention, the second approach is usually applied in universal prevention. Shek and Lee [43] have also proposed that the integration of the two approaches may represent a promising direction for problem gambling prevention.

In Hong Kong, preventive and treatment measures at different levels have been taken to tackle the issue of problem gambling. Since 2003, a foundation entitled the Ping Wo Fund has been established by the HKSAR Government to support gambling-related research, public education to prevent or alleviate social problems arising from gambling, and counseling and treatment service for problem/pathological gamblers. With this fund, four counselling and treatment centers have been established to provide remedial and services to gamblers and their family members. Several public education programmes (with the theme of "Say No to Gambling"), TV, and other media campaigns (such as radio and TV advertisements and programmes with anti-gambling messages) have been launched to raise the public's awareness of the consequences of gambling and the available services to help people. A Gambling Counseling Hotline has also been established for people to seek help starting from 2003. A study in 2011 based on telephone interview showed that 75.8% of the respondents knew the hotline number, 50.6% were aware of the existing counselling and treatment services, and 60.7% of the respondents said that they would use the services if they encountered gambling problems [23]. Up until September 30, 2017, the Caritas Addicted Gamblers Counselling Centre and the Even Centre of the Tung Wah Group of Hospitals have provided services to 5,473 and 6,325 problem gamblers [50,51]. While the statistics suggest that these services have been provided to a wide population of Hong Kong citizens, there is a lack of systematic evaluation on the effectiveness of the services as well as different public

education programmes and media campaigns, especially for youth population. Empirical evidence on whether and to what extent these measures have helped Hong Kong adolescents is critically needed.

More recently, the Hong Kong Polytechnic University and the Integrated Centre on Addiction Prevention and Treatment (ICAPT) have developed two multi-addiction prevention programs based on the integrative approach suggested by Shek and Lee [43]. The first is a universal prevention program [52], entitled the B.E.S.T. Teen, which intends to prevent different types of addiction simultaneously through 1) introducing knowledge on the nature of addiction and 2) promoting social, emotional, behavioral, and thinking competencies among adolescents. The 10-session program was implemented in 382 Primary 5 and 297 Primary 6 students from five schools. Evaluation findings based on an experimental-control group design showed that at post-test students who participated in the program reported less engagement in addictive behaviors and less intention to engage in addictive behaviors in the next two years than did students in the control group [53]. This finding, together with previous reports on the effectiveness of the Project P.A.T.H.S., provides empirical evidence for the effectiveness of the integrative approach with a focus on positive youth development in preventing addictive behaviors in Hong Kong adolescents.

The second program (“Colorful Life”) is an intervention program based on multi-addiction syndrome model, positive youth development, and expressive arts approaches, designed for both addicted parents and their adolescent children [54]. The program was offered to 47 adolescents and 22 parents. Participated adolescents were guided to discover their strengths and potential, and to develop self-regulatory skills and emotional competence through different expressive activities. Parent participants were facilitated to understand the developmental needs of child and adolescent, to learn positive parenting skills, and to be aware of the relationship between positive parenting and addiction. Evaluation findings



showed that after completion of the program, adolescents' beliefs about addiction significantly improved. At post-test, both adolescents and parents' psychosocial competencies were enhanced, and the participants expressed positive perceptions about the program content, implementers, and effectiveness of the program [55]. Notwithstanding these positive findings, no significant behavioral changes in the participants were identified. The effectiveness of the program shall be further examined in future studies.

Our review suggests that preventive programmes and strategies that specifically target at young people are very few. In fact, a large percentage of problem gamblers (around 40%) had their first time gambling during adolescence or young adulthood [51,56]. Obviously, much more attention and efforts are needed to focus on youth gambling problems in Hong Kong. Moreover, it can be seen that systematic evaluation on the effectiveness of the existing preventive measures has been scarce. While various prevention and treatment services have been provided, empirically effective programs are lacking. There is an urgent need to conduct well-designed evaluative studies to assess the impact of these services and measures. For example, the effects of existing evidence-based positive youth development programme [46-49] on youth gambling behaviors can be further examined based on randomized control trials. The findings can help policymakers and different funding bodies to identify and support the implementation of truly effective programs to prevent youth problem gambling. On the other hand, it would be a waste of time and resources, or even harmful, to continue providing service or programs that cannot help people (e.g., the Drug Abuse Resistance Education program in the United States). The current literature appears to support the effectiveness of the integrative approach that combines positive youth development and prevention science perspectives in preventing youth gambling problems. This approach could be further attempted in the future to develop preventive and interventional strategies on youth gambling.

## Summary and Conclusion

Several limitations of the present review shall be acknowledged. First, although we reviewed both key academic databases, government documents and commissioned-research reports, other grey literature, such as unpublished theses and book chapters on Hong Kong adolescent gambling, was not included, which should be addressed in the future. Second, studies with qualitative data or with non-empirical sources were excluded from the current review. There is a need to focus on such materials to gain an in-depth understanding about the developmental process of gambling involvement and gambling disorder, and the associated risk and protective factors among Hong Kong youth. Third, publications in Chinese on adolescents' gambling need to be reviewed in further study. Although the official language in Hong Kong is English, quality research findings have also been published in Chinese academic journals, which may contain important information related to the topic.

The present review revealed that the prevalence rates of gambling participation, problematic and pathological gambling in Hong Kong adolescents were generally comparable to findings based on Western youth population, although the types of gambling activities that youth participate in vary across cultures. This is consistent with the statement synthesized by other scholars that "adolescent gambling is an international problem" (Blinn-Pike et al., 2010; p. 230). In line with the global findings, being male, older age, low self-control, online gambling, cognitive bias especially illusion of control, family members' gambling behaviors and problems, were found to be associated with high risk of gambling problems in Hong Kong youth. Youth problem gamblers also reported low self-esteem, more problem behaviors, and more associations with delinquent adolescents than did non-problem gamblers. Similar to Western findings, gambling advertisement showed positive impact on youth participation in gambling, especially for older adolescents in Hong Kong. The identification of these psychosocial correlates at individual, family and peers, and

environmental levels provides useful information for the development of prevention strategies targeting youth gambling. In particular, our review shows that preventive and interventive strategies specifically developed for Hong Kong adolescents are severely lacking. Most existing prevention and intervention programs have not been systematically evaluated, and thus the effectiveness of culturally- and evidence-based intervention for Chinese problem gamblers is not clear. Despite of this, the literature supports that positive youth development approach may represent a promising direction in the prevention of youth gambling. Well-designed evaluation studies should be further carried out to examine the effectiveness of prevention/intervention strategies based on this approach.

In conclusion, although the phenomenon of youth gambling as an emerging field of research has received increasing attention in the past three decades, empirical findings on Chinese youth gambling are scarce. Echoing the recommendation by Blinn-Pike et al. [18] and Gutpa and Derevensky [57], our review suggests that greater attention should be paid to the study of youth gambling in different cultures, like Chinese, and to the examination of possible cultural differences. It is our hope that this review will increase our understanding of youth gambling when planning treatment of problem gambling and addiction in Chinese contexts, and attract more attentions from researchers to conduct research in this field.

**Conflict of interest:** The authors have no conflicts of interest to declare.

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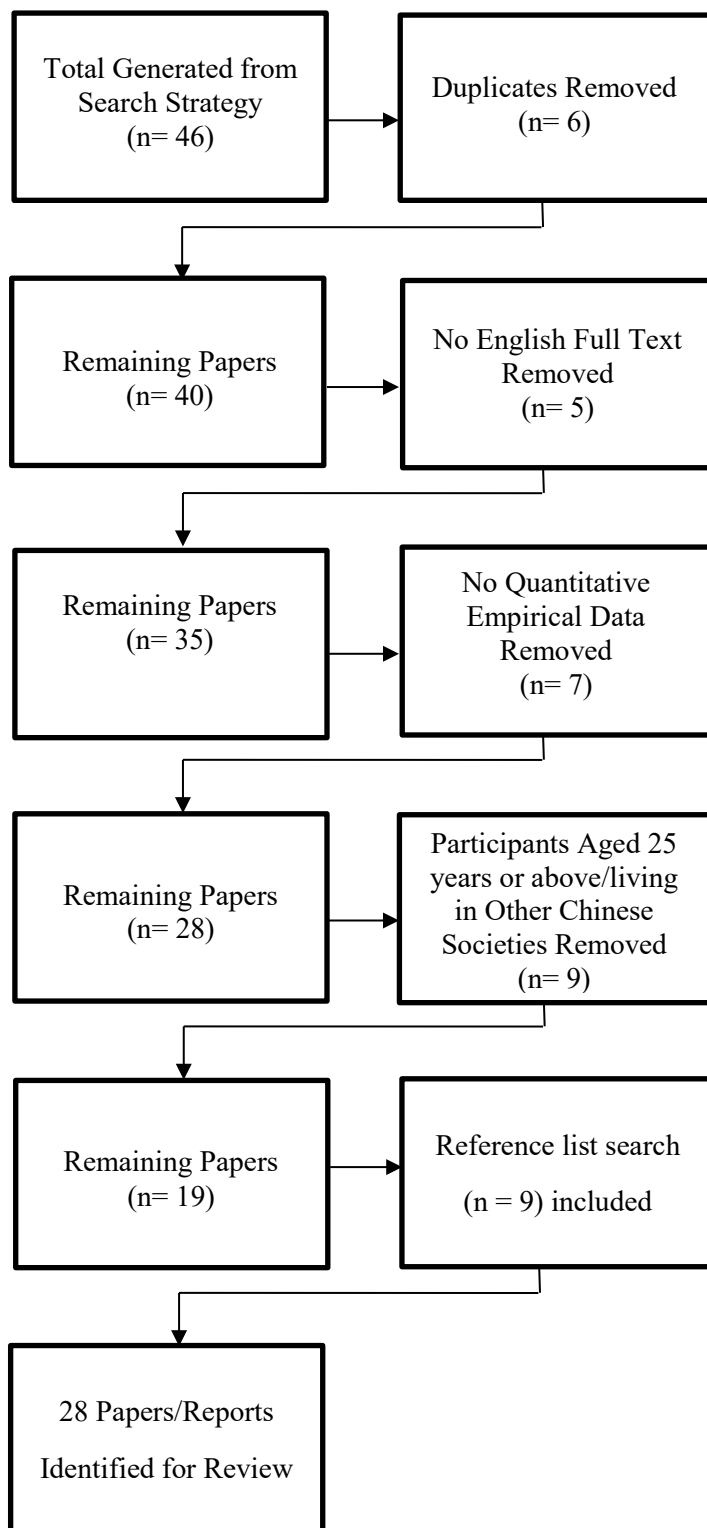
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Table 1. Prevalence rates of gambling participation, problem gambling, and pathological gambling in Hong Kong general population and youth

Author and Year	Gambling participation	Pathological gambling	Problem gambling	Measurement	Sample size	Sampling method	Age range
(HKPU, 2002)	54%	2.6%	4.5%	DSM-IV	2,000	Stratified cluster sampling	13-17
(Wong & So, 2003)	N/A	1.8%	4.0%	DSM-IV	2,004	Stratified cluster sampling	15-19
(HKU, 2005)	32.3%	1.3%	1.3%	DSM-IV	1,496	Stratified cluster sampling	12-19
(HKPU, 2008)	70%	1.7%	2.8%	DSM-IV	2,088	Stratified cluster sampling	15-18
(HKPU, 2012)	40.4%	1.8%	1.4%	DSM-IV	3,982	Stratified cluster sampling	15-18
(Cheung, 2014)	28%	1.1%	N/A	DSM-IV-J	4,734	Stratified random sampling	12-23
(Wong & So, 2013)	67%	2.7%	N/A	DSM-IV-MR-J	1,004	Stratified cluster sampling	12-19
(Hsu, Lam, & Wong, 2014)	46.5%	0.9%	N/A	DSM-IV-MR-J	926	Stratified cluster sampling	12-20
(HKPU, 2016)	30.4%	Gambling Disorder: 1.6%		DSM-V	3,318	Stratified cluster sampling	15-22
(Ho, 2017)	43.6%	4.7% in total		DSM-IV	2,775	Stratified cluster sampling	12-17

Note: all data reported were based on participants' reported gambling behaviors in the previous year (i.e., past year prevalence).



**Figure 1.** Search strategy