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**Transforming Gambling Harm Reduction in Youth: Leveraging AI Language Models for Personalized Intervention and Prevention**

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RESEARCH ARTICLE

# Transforming Gambling Harm Reduction in Youth: Leveraging AI Language Models for Personalized Intervention and Prevention

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**Abstract**

This article highlights the pressing issue of youth gambling addiction, with up to 20% of young individuals engaging in gambling activities, particularly online. With 6-9% of US youth facing gambling problems. This study explores how Large Language Models (LLMs) can enhance harm reduction by providing personalized support, early intervention, and education while respecting privacy. The article draws insights from a review of 45 studies. It was found that youth gambling addiction is a global issue exacerbated by technology and the pandemic. LLMs like GPT-4 offer promise in harm reduction by providing information and support. LLMs can provide vital insights, educational materials, and support for responsible gambling. The article acknowledges potential LLM risks and emphasizes a cautious approach. Recommendations include personalized interventions, online pop-ups, enhanced LLMs, ongoing research, multi-stakeholder collaboration, etc.

**Keywords:** Gambling, Artificial Intelligence, LLMs, Youth, Prevention

## Introduction

### Brief overview of the problem of gambling addiction and harm

Gambling typically involves participating in games of chance for monetary or other valuable rewards (Gainsbury, 2015). Remarkably, a significant number of adolescents globally engage in gambling, whether online or in traditional settings, even though they are underage as per legal gambling age regulations, which vary between 16 and 21 years, contingent on the specific country and type of

gambling (Emond & Griffiths, 2020).

The issue of gambling addiction and its associated harm among adolescents and young adults is a growing concern that demands immediate attention. Recent research has shed light on the alarming prevalence of gambling within these age groups, with estimates of problem gambling ranging from 0.2 to 12.3% (Calado, Alexandre, & Griffiths, 2017). This phenomenon has raised concerns that the rates of problem gambling among adolescents may be on par with those in the adult population (Ha & Park, 2015). Despite global legislation aimed at restricting youth access to gambling, modern technology, particularly online gaming apps and gambling venues, has significantly amplified their exposure to the risks of problem gambling (King et al., 2014).

The COVID-19 pandemic has only exacerbated the situation, as evidence suggests increased engagement with online gambling, especially among younger individuals (Håkansson, 2020). Although the surveyed populations have predominantly focused on those aged 18 and above, it is concerning that those who reported gambling problems were more likely to be younger (Jenkinson et al., 2020).

This trend is not limited to one region; it's a global issue. For instance, Nordic countries, where gambling is illegal for individuals under 18, have reported that 50-80% of adolescents have engaged in gambling (Räsänen et al., 2020). Similar patterns have emerged in countries including the United Kingdom, the United States, Canada, and Australia. In these countries, an estimated 60-80% of adolescents aged 13-17 have participated in gambling activities at least once annually, with approximately 3-5% exhibiting indications of problematic gambling behaviours (Derevensky, Gupta, & Winters, 2003). Notably, gambling has become one of the most commonly reported addictions among youth (Secades-Villa et al., 2016).

### *The need for innovative approaches in harm reduction*
The need for innovative approaches to gambling harm reduction is becoming increasingly evident. As demonstrated by a recent international meta-analysis, gambling in various forms carries a substantial risk of gambling-related problems, with factors like the speed and intensity of play, availability, and bonuses being particularly concerning (Allami et al., 2021). Demographic factors, such as young age and male gender, further exacerbate these issues (Mora-Salgueiro et al., 2021). To effectively address these challenges, it's essential to broaden the scope of harm reduction efforts beyond individual measures and consider socio-cultural influences on gambling harms (Gordon & Reith, 2019).

In doing so, we should explore universal, selective, and indicated harm reduction strategies, utilizing identification methods for age restrictions, pre-commitment tools, and self-exclusion registries to promote responsible gambling. Moreover, the integration of payment gateway services and personalized pop-ups can enhance harm prevention and reduction efforts in the online gambling environment, necessitating further research to better understand their effectiveness (Lakew, 2022). These innovative approaches are imperative to protect individuals and society from the increasing risks associated with gambling.

*Introduction to LLMs and their potential in addressing this issue*

Among AI-based technology, Large Language Models (LLMs) such as "ChatGPT, Google Bard, Perplexity, and Microsoft Bing" have emerged as powerful tools for personal education on complex issues (Biri et al., 2023) like gambling. LLMs, such as GPT-3.5, can provide valuable insights on the subject, aiding individuals in understanding gambling issues, and their potential risks.

By engaging with LLMs, individuals can access information and resources, empowering them to make informed decisions and take proactive steps to mitigate the potential harms associated with gambling. This approach not only enhances personal education but also promotes responsible and safer engagement with activities related to gambling. AI in tackling problem gambling is undeniable, offering a personalized and timely approach to help individuals maintain healthier gambling habits. As this field continues to evolve, it remains a critical component in the larger conversation about responsible gambling and harm reduction (Huang, 2020; Pearson, 2022).

## Prevalence of Youth Gambling

The prevalence of youth gambling is an alarming matter that necessitates our concern and intervention. Around 2.1 per cent of young Americans aged 14-21 experience issues related to gambling addiction and an additional 6.5 per cent are exposed to the risk of such problems (KnowTheOdds, n.d.). In the survey conducted by the Gambling Commission (2022), it was found that around 31 per cent of individuals aged 11 to 16 engaged in gambling activities. This situation is further emphasized by Bergman (2023), who highlights a concerning rise in this phenomenon, with up to 20% of American youth engaging in various gambling activities, including online betting, sports wagering, and lottery participation.

- **The Rising Tide:** Recent studies indicate a steady increase in youth gambling, with up to 20% of American youth participating in various gambling activities, including sports betting, online casinos, and lotteries.

- **Online Gambling:** Easy access to online gambling platforms contributes to the rise, with approximately 70% of American youth aged 12-17 trying online gambling at least once.

- **Gambling and Mental Health:** Youth gambling is linked to mental health issues, as over 30% of young problem gamblers also suffer from conditions like anxiety and depression, further exacerbated by the stress of gambling.

- **Co-Occurring Addictions:** Youth gamblers are at higher risk of developing co-occurring addictions, including substance abuse, smoking, and excessive video gaming.

- **Lack of Treatment:** Sadly, less than 10% of young gamblers seek treatment, often due to embarrassment or doubts about their ability to quit.

- **Relapse Rates:** Even those who seek treatment face high relapse rates, with over 90% eventually returning to their gambling habits.

- **Preventive Measures:** To combat youth gambling, it's crucial to implement education and prevention programs. Collaboration among parents, educators, and policymakers is essential to raise awareness and provide support and intervention resources.

A survey conducted by Ipsos on behalf of the Gambling Commission, shed light on the prevailing trends in gambling participation among young people in England and Scotland. The findings unveiled a concerning landscape, with 9% of 11-16-year-olds in these regions having used their own money for gambling activities in the week leading up to the survey.

Notably, the most common forms of gambling included private bets for money (5%) and card games played for money with friends (3%) within the past seven days. Over a year, a staggering 37% of young individuals had engaged in gambling. Moreover, half of the 11-16-year-olds had experienced gambling, with 51% of them being accompanied by a parent or guardian during their last gambling experience. Troublingly, 1.9% were classified as 'problem' gamblers, while 2.7% were labelled "at risk" according to the DSM-IV-MR-J screen.

Additionally, 58% of these young people reported exposure to gambling advertisements or sponsorships, influencing 7% of them to gamble when they hadn't initially planned to do so. The survey, though limited in Wales due to lockdown measures, provides crucial insights into the prevalence of youth gambling and highlights the need for awareness and preventive measures to address this issue effectively (Pye & Mason, 2020).

In Australia, the legal age for consuming gambling products is typically 18 years and older. However, recent surveys conducted in New South Wales have revealed concerning statistics. Among 12–17-year-olds, an alarming 29.9% had engaged in gambling with real money within the past year. Furthermore,

1.5% of these young individuals were classified as exhibiting problem gambling behaviours, with an additional 2.2% considered at risk of developing such behaviours (Hing et al., 2021).

Similarly, a longitudinal study focusing on Australian children aged 16–17 discovered that 5% had participated in money gambling over the past year. Of this group, 2.8% were identified as displaying problem gambling tendencies, while 9.3% were deemed at risk of developing problem gambling behaviours (Warren & Yu, 2018).

A study conducted in Germany showed that 2.3 per cent of adults were addicted to gambling, a problem that disproportionately impacted more men than women. What's even more alarming is that, despite stringent age restrictions prohibiting gambling for those under 18, a concerning 0.3 to 3 per cent of adolescents younger than 18 display signs of problematic gambling behaviour. This issue not only raises questions about the effectiveness of age restrictions but also underscores the urgent need for education and preventive measures to curb youth gambling addiction before it takes a more significant toll on the next generation (BZgA, n.d.).

### *Vulnerability and Risk Factors*

Vulnerability to gambling addiction is a complex interplay of various risk factors, and understanding these elements is crucial to recognizing signs of concern in yourself or others. Stress, impulsivity, and early exposure to gambling are common risk factors, and they can influence the development of a gambling disorder. For instance, individuals under stress may turn to gambling as a coping mechanism, while young people might experiment with gambling as they navigate self-esteem and peer approval challenges. Moreover, the co-occurrence of mental health disorders, like depression and anxiety, can contribute to a heightened risk of gambling addiction (Sharman, Butler, & Roberts, 2019; Gateway Foundation, n.d.).

Notably, men tend to be more at risk than women, as they often exhibit a higher tendency for risk-taking behaviour and social anxiety. Peer pressure, medications like dopamine agonists, specific personality traits, self-esteem issues, and cultural background also play a role in gambling vulnerability. Recognizing these risk factors is essential for early intervention, harm prevention, and seeking help when needed (Gateway Foundation, n.d.).

### *Consequences of Youth Gambling*

The rise in youth gambling, facilitated by online technology and widespread internet access, poses a significant modern-day concern. This digital allure exposes young minds to serious gambling issues, often masked within video games like loot boxes. Operators entice players with the promise of great

rewards, but the fleeting nature of "hot streaks" ultimately leads to problems. Research reveals that over 450,000 UK children engage in gambling, despite age restrictions, and these young gamblers may face psychological and behavioural consequences, from depression to substance abuse. To address these issues, raising awareness and promoting responsible gambling practices is crucial, necessitating a holistic approach to addiction treatment and creating safer environments for youth to thrive (Elever, n.d.).

### Online Gambling Among Youth

Online gambling encompasses a variety of betting and gaming activities facilitated through internet-connected devices (Gainsbury, 2015). Gambling behaviours vary along a continuum from recreational to problematic forms, and the advent of online gambling has introduced new challenges, particularly among adolescents. This demographic is especially vulnerable due to developmental characteristics, impulsivity, and easy access to online platforms. While males traditionally showed a higher risk of gambling problems, recent trends indicate increased online gambling among females. The rapidly changing landscape of online gambling necessitates ongoing research to comprehensively understand the associated risks and vulnerabilities among adolescents (Calado, Alexandre, & Griffiths, 2017; Hollén et al., 2020).

### Prevention and Intervention Challenges

Youth gambling is on the rise, influenced by the internet and liberalized regulations (Bjørseth et al., 2021). Online forms, like micro-transactions and sports betting, have made it enticing for young individuals, leading to a surge in at-risk gamblers. The appeal is further fuelled by advertising portraying gambling as socially desirable and fun (Pérez-Aranda et al., 2022). Interventions are crucial, as the age of initial gambling experiences falls between 10 and 19 years (Jiménez-Murcia et al., 2010). Prevention strategies, including universal, selective, and indicated approaches, are vital, but updated research, especially on online gambling's prevalence, is needed (Keen, Blaszczynski, & Anjoul, 2017). Addressing and preventing youth gambling is paramount given its substantial public health impact (Bjørseth et al., 2021).

## Impact of Gambling

The impact of gambling, especially on youth, is a growing concern with the rise of various gambling opportunities and easy accessibility. Research indicates that approximately 80% of adolescents have tried gambling, and a worrying 4–8% of adolescents between 12 and 17 face severe gambling problems, with an additional 10–15% at risk (Jacobs, 2000; Hardoon, Derevensky, & Gupta, 2002).

What's most alarming is the elevated prevalence rates of probable pathological gambling in youth (4–8%) compared to the general adult population (1–3%). Problematic gambling among adolescents is linked to various mental health outcomes, including depression, increased risk of suicide, anxiety, and substance abuse disorders. Furthermore, it leads to academic problems, delinquency, and disrupted familial relationships, necessitating a comprehensive public health response (Derevensky et al., 2003).

The emergence of online gambling, fuelled by technological advancements, further complicates the issue as it offers easy access and anonymity to young people. It's imperative to address this public health concern with a multifaceted approach encompassing prevention, protection, denormalization, and harm reduction. Public policy, regulations, and public advocacy play a vital role in safeguarding the younger generation from the adverse effects of gambling (Messerlian, Derevensky, & Gupta, 2004).

## The Need for Innovative Approaches in Harm Reduction

When addressing youth gambling prevention, two main strategies emerge abstinence and harm minimization, with the latter focusing on reducing the negative consequences of risky behaviours without requiring complete abstinence (Messerlian, Derevensky, & Gupta, 2004). While most jurisdictions prohibit youths from accessing regulated gambling venues, the practicality of complete abstinence is questioned due to the widespread involvement of adolescents in gambling activities. Youth prevention programs predominantly adopt a harm-minimization approach, emphasizing "responsible gambling" and encompassing educational objectives such as differentiating between chance and skill games, dispelling gambling misconceptions, teaching about probabilities, identifying signs of problem gambling, and providing resources for those at risk (Ladouceur, Goulet, & Vitaro, 2013).

These programs, although relatively uncommon, underline the necessity of a coordinated and comprehensive approach to reach a wide audience. Given the rise of online and mobile gambling, new challenges have arisen, including the normalization of gambling behaviours among children and adolescents through online social casino games. Experts have responded by developing responsible gambling tools for online platforms, like limit setting and personalized feedback, to modify gambling behaviour in real-time, especially as mobile gambling gains prominence (Auer & Griffiths, 2015).

Information campaigns aim to educate individuals about their gambling limits and provide resources for help, and educational programs target professionals to enhance their knowledge about gambling and debunk common myths (Williams, West, & Simpson, 2012). This multifaceted approach addresses

youth gambling prevention, considering both abstinence and harm minimization strategies (Messerlian, Derevensky, & Gupta, 2004; Ariyabuddhiphongs, 2013).

The arrival of large language models (LLMs), such as "GPT-4," has significantly expanded their potential applications, including addressing issues related to gambling harm (Touvron et al., 2023). LLMs, known for their remarkable language processing capabilities, have the potential to play a vital role in offering innovative solutions for gambling harm reduction. These models exhibit capabilities like "*improved few-shot learning, in-context learning, and chain-of-thought reasoning*", which can be harnessed to develop more effective interventions in the gambling harm space (Bommasani et al., 2021).

These models can play a pivotal role in addressing gambling harm among youth by providing valuable insights and support. LLMs, with their large number of parameters and web-scale training data, can analyse trends, risk factors, and emerging issues related to youth gambling. By fine-tuning LLMs for specific applications and aligning their behaviour with the goal of harm reduction, they can assist in developing educational materials, chatbots, and tools that promote responsible gambling behaviour among young individuals. However, as demonstrated by recent research (Ouyang et al., 2022), there are potential risks associated with fine-tuning aligned LLMs, including unintentional safety issues and susceptibility to adversarial risks. Therefore, it is imperative to cautiously harness the power of LLMs in the context of gambling harm reduction for youth, while addressing potential risks through rigorous evaluation and safety measures (Qi et al., 2023).

## Recommendations

The study recommendations are as under:

- **Adaptive and Personalized Intervention**: Utilization of LLMs for creating personalized intervention strategies aimed at young individuals who may be susceptible to gambling problems. These strategies should be flexible, providing customized assistance that aligns with an individual's specific risk factors and behavioural attributes.

- **Online Pop-Up Interventions**: Implementation of AI-driven pop-up interventions within online gambling platforms that engage users when risky behaviour is detected. These pop-ups can provide information, resources, and self-exclusion options for individuals showing signs of problem gambling.

- **Integration of LLMs in Prevention Strategies**: Collaboratation with AI researchers to further enhance the capabilities of LLMs in the context of youth gambling prevention. Explore the use

of machine learning and natural language processing to improve the early detection of risky behaviour and personalize harm reduction strategies.

- **Research and Continuous Evaluation**: Support of ongoing research into the effectiveness of AI-driven interventions, LLMs, and other technology-based approaches in addressing youth gambling harm.

- **Multi-Stakeholder Collaboration**: Encouragement of collaboration between government agencies, non-profit organizations, educational institutions, the gaming industry, and AI developers to create a comprehensive approach to tackling youth gambling harm. Pool resources, knowledge, and expertise to develop effective strategies.

- **Regular Reporting and Data Analysis**: Implementation of mechanisms for regular reporting and data analysis to track youth gambling trends, the effectiveness of prevention strategies, and areas requiring further attention. Data-driven decision-making is crucial in refining harm-reduction efforts.

## Conclusions

The issue of gambling addiction and its associated harm among youth is a pressing concern, with increasing evidence of their engagement in gambling, whether online or in traditional settings, despite legal age restrictions. This problem is exacerbated by technological advancements and exacerbated by the COVID-19 pandemic, leading to higher rates of online gambling engagement. It is a global issue, impacting countries across the world, and gambling addiction ranks as one of the most commonly reported addictions among the youth. With the increasing occurrence of youth gambling, there is a pressing demand for innovative approaches to reduce harm.

Addressing the challenges posed by youth gambling requires a comprehensive strategy that goes beyond individual measures. Universal, selective, and indicated harm reduction strategies are essential, including identification methods for age restrictions, pre-commitment tools, self-exclusion registries, and innovative techniques like payment gateway services and personalized pop-ups. Such approaches aim to promote responsible gambling and protect vulnerable youth from the potential harm associated with gambling. Public awareness, policy changes, and effective regulations must be part of the solution.

The emergence of LLMs presents an opportunity to contribute to the efforts of addressing youth gambling harm. LLMs, such as GPT-4, possess advanced natural language processing capabilities that can be harnessed to provide valuable insights, educational materials, and support for individuals seeking information on responsible gambling. However, it is crucial to acknowledge the potential risks

associated with LLMs, including safety issues and adversarial risks. A cautious approach, including thorough evaluation and safety measures, is necessary to harness the potential of LLMs effectively.

In conclusion, youth gambling is a growing concern with significant public health and societal implications. To address this issue, it is imperative to implement innovative harm reduction strategies and leverage the capabilities of advanced technologies like LLMs while also addressing the associated risks. By adopting a multifaceted approach, we can work towards mitigating the harm associated with youth gambling and promoting responsible gambling practices, ultimately safeguarding the well-being of the younger generation.

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