

# Video Lottery Terminal Access and Gambling Among High School Students in Montréal

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## ABSTRACT

**Background:** Gambling is a risky behaviour that involves uncertain financial outcomes, can be addictive, and has been associated with strongly adverse social and public health outcomes. We wanted to assess whether socio-economic and gambling-related-opportunity environments of neighbourhoods affected the uptake of video lottery terminal (VLT) gambling among Montréal youth.

**Methods:** Spatial and statistical analyses were conducted to examine geographical patterns of neighbourhood socio-economic conditions, VLT sites (n=407), and high school locations (n=305) within the Montréal Census Metropolitan Area (CMA). VLT concentration within high school neighbourhoods was measured to examine how the number of VLT opportunities varies according to socio-economic status of the school neighbourhood. A student survey was analyzed using logistic regression analysis to explore the role of individual (student) characteristics and environmental (neighbourhood) characteristics in predicting the VLT gambling behaviours reported among a sample (n=1206) of high school students.

**Results:** Video lottery gambling opportunities are more prevalent near schools located in socio-economically deprived neighbourhoods compared with schools located in more affluent neighbourhoods. The principal individual risk factors for VLT gambling were shown to be male sex, peer VLT-use, substance use, as well as the after-school routines of youth.

**Interpretation:** The spatial distribution of VLTs reflects local geographies of socio-economic disadvantage and may have a pronounced impact on students attending schools in lower income neighbourhoods, especially those with individual risk factors. Efforts to reduce gambling-related public health costs may want to take into account the socio-spatial distribution of gambling opportunities, particularly in the local environments that youth frequent.

**MeSH terms:** Adolescent behaviour; gambling; risk-taking; social conditions; school characteristics; video lottery terminals (VLTs)

*La traduction du résumé se trouve à la fin de l'article.*

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Gambling is a risky behaviour that involves uncertain financial outcomes, can be highly addictive, and has been associated with strongly adverse social and public health outcomes.<sup>1-4</sup> This paper scrutinizes the distribution of video lottery gambling sites in Montréal and its suburbs in an effort to better understand the social and spatial patterning of gambling opportunities in relation to youth environments. Moreover, we aim to reveal how both individual and contextual risk factors influence the likelihood of gambling among vulnerable youth populations. There is general consensus among public health researchers and practitioners that the social environment plays a substantial role in shaping the health-related behaviours and overall health status of populations.<sup>5-9</sup> The role that the social environment plays in shaping the developmental and health outcomes of adolescents (aged 12 to 19 years) is of particular importance, since youth are a vulnerable and impressionable population. Like childhood experiences and behaviours developed, the adolescent life stage can influence healthy or unhealthy lifestyles that follow youth into their adult years.<sup>10-14</sup> As this period is marked by changing experiences, roles, and opportunities for independence, youth are often highly influenced by their peer groups, family contexts, as well as their school and neighbourhood environments. Social environments of particular relevance to youth thus include families, peers, schools and neighbourhood contexts.<sup>12,14</sup> This research examines gambling as a poignant example of a health-related behaviour, and examines VLTs in particular since they are recent and proximal additions within the local urban landscapes that youth frequent.

Gambling is linked to other health-related activities including suicide, depression, criminal and delinquent behaviour, domestic violence and increased chances of developing multiple addictions.<sup>2,15-18</sup> Studies on youth have revealed that up to 80% gamble in a given year and also exhibit problem gambling behaviours at higher rates than adults.<sup>16,19-21</sup> Underage youth gambling is thus becoming an increasing public health concern due to the potential adverse health effects as well as the proven popularity and accessibility of gambling activities to minors.<sup>1,3,21-24</sup> VLTs are a type of Electronic Gaming Machine

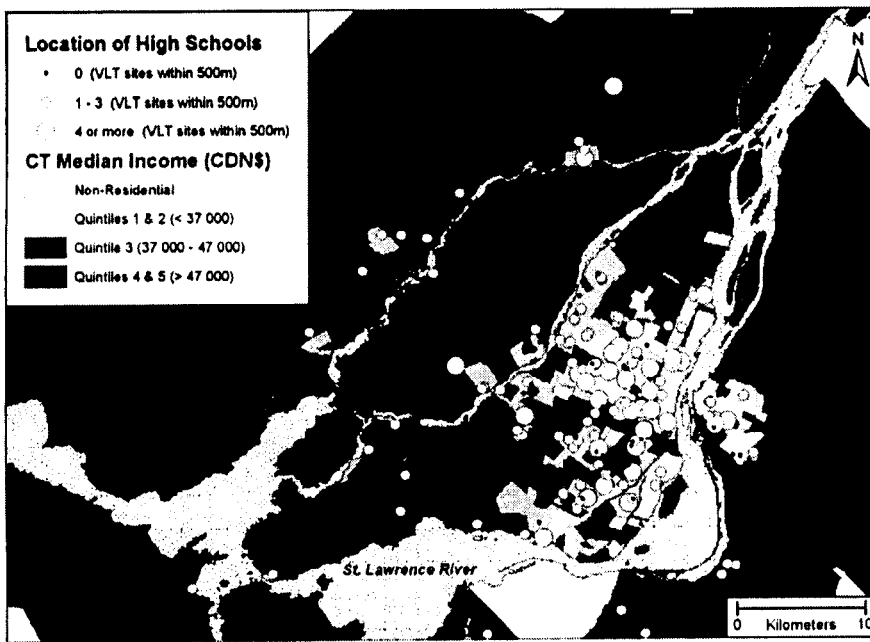


Figure 1. Concentration of VLT sites within 500m of high school locations and neighbourhood median household income

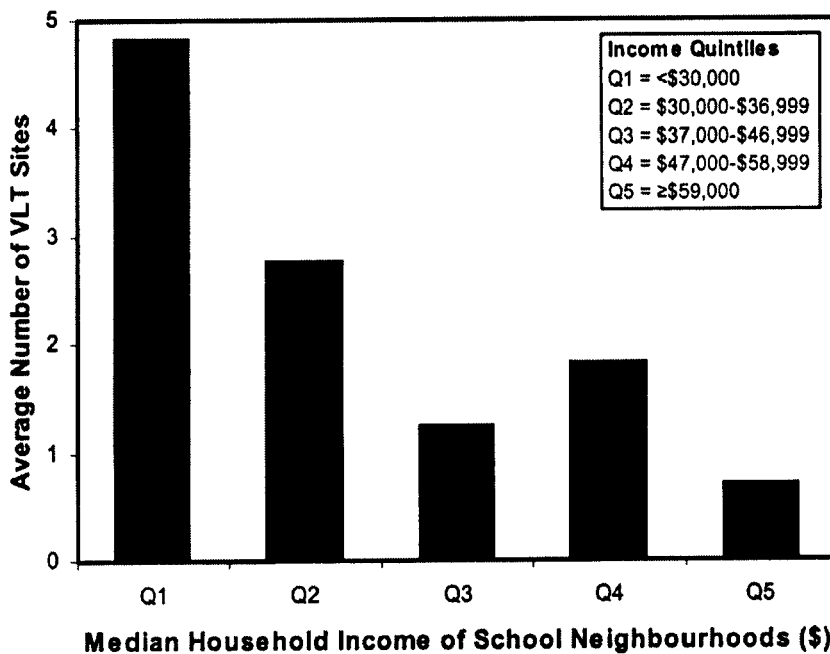


Figure 2. VLT opportunities decline with increasing school neighbourhood affluence

(EGM) that offer players the choice of several fast-paced games such as poker and blackjack. These machines provide visual and audio effects, and are considered to be more addictive than traditional gambling activities; as a result, VLTs are commonly referred to as the 'crack cocaine' of gambling.<sup>25,26</sup> Since their legalization in

Québec (1994), the video lottery system has grown into a network of 14,007 VLTs distributed among 3,267 sites throughout the province, one third of which are located in Montréal.<sup>27</sup> Furthermore, VLTs combined with lotteries in Quebec have consistently been the greatest sources of revenue of all legalized gambling activities

for Loto-Québec since their legalization. Minors (under 18 years of age in Québec) are legally restricted from using VLTs and participating in other gambling activities. Access to and use of VLTs is common in Québec however, due to negligent enforcement at VLT sites, which are located within liquor-licensed establishments.

Preceding this analysis, Gilliland and Ross<sup>28</sup> found a spatial distortion of VLTs and socio-economic conditions in Montréal and Laval, demonstrating that those with the lowest socio-economic status – and thus the most to lose from adverse impacts of gambling – have the greatest accessibility to VLTs. Efforts to reduce the burden of gambling-related public health costs may wish to take into account the socio-spatial distribution of gambling opportunities, particularly in the local environments that vulnerable youth frequent. We thus examine youth VLT gambling by analyzing the spatial distribution of VLTs and socio-economic conditions in the daily school environments of youth across greater Montréal. In addition, we examine the gambling behaviours of youth in the context of their school neighbourhoods to better understand youth behaviours as a product of local opportunity structures. We accomplish this by examining VLT access surrounding schools in relation to youth VLT gambling behaviours reported among a sample of students attending eight high schools in greater Montréal.

**METHODS**

Using spatial and statistical analyses, we examined locational patterns of VLT sites (n=407), high school (n=305) locations, neighbourhood socio-economic conditions and individual youth gambling behaviours. Addresses and the number of VLT licences for all liquor establishments in 2002 were obtained for the province of Québec from the *Régie des alcools, des courses et des jeux* (RACJ), the provincial department that oversees the gambling industry. School listings and addresses for the province of Québec were obtained from the *Ministère de l'Éducation* in 2002. Demographic data for the Montréal CMA was obtained at the census tract level from the 2001 Canadian Census, provided by Statistics Canada. Information about the gambling behaviours of high school students (n=1206) was

obtained from a larger survey administered in 2003 through the International Centre for Youth Gambling Problems and High-Risk Behaviours at McGill University.<sup>29</sup> The response rate was 97%.

VLT gambling opportunities of high school neighbourhoods were explored by linking neighbourhood socio-economic conditions with school and VLT locations in Montréal. A geographic information system (GIS) was created to explore VLT sites and socio-economic conditions of high school neighbourhoods. The listings of all liquor establishments with VLT licences and secondary schools within the Montréal CMA were geocoded using GeoPinPoint [DMTI Spatial] and ArcGIS [ESRI] software. Neighbourhoods defined by census tracts (n=862) were characterized using indicators of socio-economic conditions. We then calculated a measure of 'VLT concentration' for every high school neighbourhood to examine how VLT opportunities surrounding high schools vary according to socio-economic characteristics. VLT concentration was calculated by measuring the number of VLTs accessible to students via a short walk (500m) from a secondary school. ArcGIS software was used to create 500m radius buffers around schools and to calculate the number of VLT sites within each school buffer.

Finally, we investigated the role of individual and environmental factors in gambling uptake using a 'VLT access' measure and analysis of gambling behaviours reported by our sample of high school students. Our environmental 'access' measure for VLTs was aimed to capture proximal density as well as regularity or 'commonness' of VLTs relative to the occurrence of liquor establishments. Since VLT licences are voluntary for bar owners, VLT access will not necessarily be high in an area unless these establishments have obtained VLT licences. We felt that this assessment of neighbourhood VLTs allowed for a more sensitive evaluation of how normalized or acceptable VLT gambling might be in particular neighbourhoods. We thus considered both the availability of VLTs in the environments youth frequent, as well as the role of localized gambling cultures in influencing the likelihood of whether or not a youth chooses to gamble.

A spatial interaction model based on straight-line distances between secondary

**TABLE I**  
Summary of High School Student Survey

|                          |                   | % of Full Sample (n=1206) | % of Gamblers (n=686) | % of VLT Users (n=113) |
|--------------------------|-------------------|---------------------------|-----------------------|------------------------|
| Gender                   | Male              | 49.8                      | 54.8                  | 69.9                   |
|                          | Female            | 50.2                      | 45.2                  | 30.1                   |
| Age (years)              | 12-13             | 18.2                      | 14.4                  | 11.5                   |
|                          | 14-15             | 44.6                      | 43.7                  | 38.1                   |
|                          | 16-17             | 34.9                      | 39.5                  | 45.1                   |
|                          | 18+               | 2.3                       | 2.3                   | 5.3                    |
| Grade Level              | Grade 7/8         | 27.0                      | 23.3                  | 19.5                   |
|                          | Grade 9-12        | 73.0                      | 76.7                  | 80.5                   |
| Other Behaviours         | Drink             | 58.4                      | 70.3                  | 81.4                   |
|                          | Smoke             | 28.3                      | 35.3                  | 54.0                   |
|                          | Use drugs         | 23.2                      | 31.2                  | 55.8                   |
|                          | Gamble weekly     | 10.4                      | 18.2                  | 39.8                   |
|                          | Gamble alone      | 6.5                       | 9.2                   | 12.4                   |
| After School Destination | Friends play VLTs | 20.6                      | 27.7                  | 62.8                   |
|                          | Not directly home | 12.4                      | 15.9                  | 30.1                   |

school (n=8) postal code centroids and VLT locations was used to create an index of VLT access.<sup>30</sup> Each school was characterized as either high or low risk using this measure. VLT access was calculated by looking at the number of VLT licences (0, 1 or multiple) at the 10 nearest bars to the school's 6-digit postal code. The VLT access of each school was calculated by summing the product of a distance weight (starting at 1 for the closest VLT and using 10% decrements until the weight reaches 0, at the 11<sup>th</sup> VLT) and a VLT score (0 for bars with no VLT licence, 1 for bars with a single licence and 2 for bars with more than a single licence).

The high school survey examined a range of demographic characteristics, and explored a variety of gambling and related behaviours and preferences (for a detailed description of instruments used and administration of survey, see Byrne et al.<sup>31</sup>). Twelve items at the end of the survey queried youth more specifically about use, exposure and awareness of VLTs. All logistic regression analyses were done using SPSS [Version 13] software. Explanatory variables selected for the final analysis included: sex; age; whether or not the student had smoked, used drugs or consumed alcohol in the past 12 months; whether or not VLTs are used by friends of the student; whether or not the student returns home directly after school; and the VLT access measure.

## RESULTS

High schools located in the inner city typically provide the highest VLT accessibility to their student populations with high numbers (4 or more) of VLT gambling

sites located nearby. Further, there are greater VLT opportunities in economically disadvantaged high school neighbourhoods across Montréal. In contrast, most of the high schools in the suburban (and often higher income) areas in Montréal have fewer (typically zero) VLTs within walking distance. Students attending schools in the inner-city or economically disadvantaged neighbourhoods are much more likely to encounter VLTs during their daily school routines (within 500m of the school they attend) than those students attending schools in suburban and economically advantaged neighbourhoods (Figure 1). Indeed, analyses of VLT opportunities by high school neighbourhood income show that as the median household income of the school neighbourhood decreases, the number of VLTs within 500m of high schools increases in gradient-like fashion (Figure 2).

High school participants included a total of 1,206 youth (606 females, 600 males) from grade seven to grade twelve (age range 12-20 years old) (Table I). Over half (56.9%) of the high school students reported having gambled in the last 12 months, and 10.4% reported playing on a weekly basis. Over one fifth (20.6%) of the students reported having friends who play VLTs, and 9.4% reported playing VLTs themselves. While males and females were almost equally likely to report gambling within the last year, males reported using VLTs more than twice as often as females. In addition to gambling, more than half (58.4%) of the sample indicated that they consumed alcohol in the past year, and roughly a quarter indicated that they smoked or used drugs in the past year (28.3% and 23.2%, respectively).

**TABLE II**  
**Modeling VLT Uptake Among High School Students**

| Outcome Variable      |        | Participates in Video Lottery Terminal Gambling (Yes, No*) |                      |
|-----------------------|--------|--|----------------------|
| Independent Variables |        | Odds Ratios  | Confidence Intervals |
| Sex                   | Men    | 1.76†  | 1.09, 2.85           |
|                       | Women* | 1.00   | -                    |
| Age Group             | 18+    | 1.33   | 0.36, 4.87           |
|                       | 16-17  | 1.05   | 0.47, 2.34           |
|                       | 14-15  | 0.87   | 0.39, 1.94           |
|                       | 12-13* | 1.00   | -                    |
| Substance Use         | Yes    | 2.67‡  | 1.38, 5.15           |
|                       | No*    | 1.00   | -                    |
| Friends Play VLTs     | Yes    | 5.90§  | 3.68, 9.46           |
|                       | No*    | 1.00   | -                    |
| Home After School     | No     | 2.72§  | 1.63, 4.54           |
|                       | Yes*   | 1.00   | -                    |
| VLT Access            | High   | 1.36   | 0.78, 2.39           |
|                       | Low*   | 1.00   | -                    |

\* Reference category - Not applicable  
 † p<0.05 ‡ p<0.01 § p<0.001

Of those high school students reporting that they had played VLTs in the last 12 months (n=113), over two thirds (69.9%) were males. Nearly two thirds (62.8%) of students who play VLTs reported that their friends also play VLTs, and over one third (39.8%) reported gambling on a weekly basis. The vast majority (81.4%) of VLT players consumed alcohol in the past 12 months, and over half smoked or used drugs in the past year (54.0% and 55.8%, respectively). Further, VLT players more often reported gambling alone and going to a non-home destination after school when compared with the non-VLT players.

In models of VLT use, we find that males have nearly twice (1.76) the odds of playing than females (Table II). As age increases, the odds of VLT use increase slightly. Students who have smoked, consumed alcohol or drugs in the last year have over two and a half times greater odds of playing a VLT than high school students who do not engage in these behaviours. Students whose friends use VLTs have nearly six (5.90) times greater odds of using VLTs themselves as those with friends who do not use VLTs. Further, we find that the patterned behaviours of youth on their daily journey to and from school also make a difference in the probability of VLT use. Students who do not go straight home after school were found to have nearly three (2.72) times greater odds of VLT gambling than those who do go straight home from school. Finally, in examining VLT availability within school neighbourhoods, we find nearly 40% greater odds (1.36) of VLT use for stu-

dents attending schools in neighbourhoods that have high VLT access.

## DISCUSSION

High schools located in lower income and inner-city neighbourhoods have more video lottery opportunities within a short walk (500m or less) than high schools located in higher income and suburban neighbourhoods in Montréal. Although many schools have VLTs within walking distance, those schools in low-income neighbourhoods tend to have higher concentrations of VLTs nearby. The distribution and accessibility of VLTs surrounding high schools in Montréal reflects local geographies of socio-economic disadvantage.

Results from analyses of the student survey indicate that VLT players are more likely to be male, and are typically youth who are engaging in multiple risky behaviours such as drinking, smoking and drug use. VLT players typically travel to another destination before returning home on a daily basis, and are also more likely to have friends who use VLTs. These findings suggest that local VLT opportunities, peer behaviours, and after-school activities may play a role in the development of youth gambling behaviours. We consider both the availability of VLTs in the environments youth frequent, as well as the role of localized gambling cultures as strong factors influencing the likelihood of whether or not a youth chooses to gamble. Efforts to reduce the burden of gambling-related public health costs must recognize the socio-spatial distribution of gambling opportunities, particularly in the local

environments that vulnerable youth frequent. Furthermore, the findings suggest that greater attention needs to be given to the role of social environments in promoting/discouraging gambling activity, particularly in lieu of the prevailing gambling culture that has evolved in North American society in recent years.

Subsequent research will move beyond a focus on school environments to explore the home environments of youth and will link the neighbourhood level and individual level data in a hierarchical linear model. Additionally, the perceptions of youth will be explored using focus group interviews so that a better understanding is gained of the attitudes about VLTs held by young people in relation to public health, entertainment, acceptability and restriction of use and access. Understanding youth norms and attitudes about VLTs is imperative to begin to prevent the onset of this risky behaviour and work towards reducing the adverse social, health and economic costs of VLT addiction.

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**RÉSUMÉ**

**Contexte :** Le jeu est un comportement très risqué dont les résultats financiers sont incertains, qui peut être accrocheur et qu'on a associé avec des résultats fortement indésirables pour la santé sociale et publique. Nous voulions déterminer si le contexte socioéconomique et l'environnement qui offre des possibilités reliées aux jeux de hasard dans les quartiers avaient un effet sur l'utilisation des appareils de loterie vidéo (ALV) chez les adolescents de Montréal.

**Méthodologie :** Nous avons procédé à des analyses spatiales et statistiques pour déterminer les tendances géographiques de la conjoncture socioéconomique des quartiers, les sites d'ALV (n=407) et l'emplacement des écoles secondaires (n=305) dans la région métropolitaine de recensement (RMR) de Montréal. Nous avons mesuré la concentration d'ALV dans les quartiers des écoles secondaires afin de déterminer comment le nombre de possibilités offertes par les ALV varie en fonction de la situation socioéconomique du quartier où se trouve l'école. Nous avons analysé les résultats d'un sondage mené auprès des élèves en procédant à une analyse de régression logistique afin d'étudier le rôle des caractéristiques individuelles (étudiant) et environnementales dans la prédiction des comportements de jeu aux ALV déclarés dans un échantillon (n=1 206) d'élèves du secondaire.

**Résultats :** Les possibilités de jeu par appareils de loterie vidéo sont plus prévalentes à proximité des écoles situées dans des quartiers démunis sur le plan socioéconomique comparativement à celles qui se trouvent dans des quartiers plus riches. On a démontré que les principaux facteurs de risque individuels de jeu aux ALV étaient le sexe masculin, l'utilisation d'ALV par des pairs, la consommation de substances, ainsi que les habitudes des adolescents après les heures de cours.

**Interprétation :** La répartition spatiale des ALV reflète les caractéristiques géographiques locales du désavantage socioéconomique et peuvent avoir un effet prononcé sur les élèves qui fréquentent des écoles de quartiers à revenu plus faible, et en particulier sur ceux qui présentent des facteurs de risque individuels. Les efforts visant à réduire les coûts de la santé publique reliés aux jeux de hasard peuvent tenir compte de la répartition sociospatiale des possibilités de jeu de hasard, et en particulier de l'environnement local fréquenté par les adolescents.



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