

## Magnifico, Rose

**Subject:** [External] Files OP .19.014, Z.19.038 and 19T-19V007  
**Attachments:** (1).pdf; (2).pdf; (3) (1).pdf; (4) COW January 29 2013.pdf; (5) COW MAY 2018 (1).pdf; (6) COW June 19 2018.pdf

**From:** Hatem Abu El-Neel [REDACTED]  
**Sent:** Tuesday, March 10, 2020 10:28 AM  
**To:** Coles, Todd <Todd.Coles@vaughan.ca>; Clerks@vaughan.ca  
**Subject:** [External] Files OP .19.014, Z.19.038 and 19T-19V007

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Communication
COUNCIL: Mar 11/20
PH Rpt. No. 10 Item 4

March 10, 2020  
Todd Coles  
City Clerk  
2141 Major Mackenzie Drive  
Vaughan, Ontario  
L6A 1T1

Dear Mr. Coles

**Re:** Clubhouse Developments Inc., 20 Lloyd Street (Board of Trade Golf Course), 241 Wycliffe Avenue, 737 and 757 Clarence Street

Files OP .19.014, Z.19.038 and 19T-19V007

By this email I am formally submitting my objection to the above highlighted complete application and request that you forward a copy of this email to the Mayor and all Vaughan Councillors as well as to the city planners.

I'd like also to draw the attention to few researches/points;

1. The impact on the health of residents when moving from greener to less green areas has been the subject of a UK research that showed a significant persistent deterioration in mental health of individuals as the surrounding environment becomes less green (the deterioration started as early as one year prior to the actual transformation taking place and the mental health never returned back to its base line during the full duration of the study which was 3 years after the move). Please bear in mind that most of the studied individuals in this research had willingly decided to move to a less green area in order to upgrade to better, bigger homes or stay closer to family and friends, imagine the health impact on residents like my neighbors and myself who have to give up on the green space and experience worse traffic & loss of property value all forced on us. **Attachment (1)**
2. The dollar value of the green space has been the subject of a CANADIAN research that quantified the monetary value of green space on the health (physical and mental) of individuals. The research shows that the value is equivalent to tens of thousands of Dollars of yearly personal income, this shows the magnitude of the impact on the current residents if this valuable green space gets destroyed. **Attachment (2)**
3. The health impact of a major development project (Gambling expansion in the GTA) was the subject of a technical report prepared by Toronto Public health & Center of Addiction & Mental Health which studied the mental health & Social impact of such development on the society and came up with a list of recommendations. **Attachment (3)**

4. The city of Vaughan did consider the recommendations from the aforementioned technical report while discussing the Casino proposal as shown in the minutes from the C.O.W. meeting on January 29, 2013. While the Casino project seemed to be excellent from all aspects (financial, security, etc.) it seemed to pose social and mental health risks to the residents. **Attachment (4)**

5. Vaughan city council, in light of some of the above points and the requests from the residents, recommended during a C.O.W. meeting on May 8, 2018 **Attachment (5)** to study the health impact of the above development on the health of the residents, in addition to other impact studies. During a council meeting June 19, 2018 **Attachment (6)** the council retreated and deleted the need to conduct the health/social impact study of developing the Board of Trade Golf course since it's not part of the regulatory frame work (as per the response from Vaughan planning department)

The negative health impact of such developments is scientifically well documented and this particular one sets precedence to many similar developments in the future, taking into account the number of golf courses in the region, which would affect thousands of residents in Vaughan alone.

The deterioration in mental health is a major cause of loss of productivity for an average person, yet in more serious forms it might result in disabilities, familial & interpersonal problems, self harm and harm to others.

I'm kindly requesting the council members of Vaughan to direct the planning staff to seek the help of specialized public health personnel (could be from York Region public health) to prepare a technical report about the health/social impact of this development and give recommendations that would help to protect all current and future residents.

It's a one chance only, at least for this development, to study this important aspect before we experience an irreversible damage.

Thanks & regards,

Hatem ABOU EL NILE

Resident at [REDACTED] Kilmuir gate, Vaughan ON [REDACTED]



## Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas

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### Supporting Information

**ABSTRACT:** Despite growing evidence of public health benefits from urban green space there has been little longitudinal analysis. This study used panel data to explore three different hypotheses about how moving to greener or less green areas may affect mental health over time. The samples were participants in the British Household Panel Survey with mental health data (General Health Questionnaire scores) for five consecutive years, and who relocated to a different residential area between the second and third years ( $n = 1064$ ; observations = 5320). Fixed-effects analyses controlled for time-invariant individual level heterogeneity and other area and individual level effects. Compared to premove mental health scores, individuals who moved to greener areas ( $n = 594$ ) had significantly better mental health in all three postmove years ( $P = .015$ ;  $P = .016$ ;  $P = .008$ ), supporting a “shifting baseline” hypothesis. Individuals who moved to less green areas ( $n = 470$ ) showed significantly worse mental health in the year preceding the move ( $P = .031$ ) but returned to baseline in the postmove years. Moving to greener urban areas was associated with sustained mental health improvements, suggesting that environmental policies to increase urban green space may have sustainable public health benefits.



## ■ INTRODUCTION

Unipolar depressive disorders are now the leading cause of disability in middle to high income countries,<sup>1</sup> making mental health and wellbeing a critical modern public health issue. This trend may be related to increased urbanisation,<sup>2</sup> with 77.7% of people in the world's more developed regions now residing in urban areas, and to reduced access to “natural” spaces which aid stress reduction.<sup>3,4</sup> Support for this possibility comes from epidemiological studies which find that individuals living in the greenest urban areas tend to have better mental health than those in the least green areas.<sup>5,6</sup> Similar patterns are found for a range of physical health outcomes,<sup>7</sup> including mortality.<sup>8</sup> Experimental findings and field observations on the effects of green space exposure on psychological health are also consistent with this epidemiological evidence.<sup>9,10</sup>

However, to date most epidemiological research has used cross-sectional data which limits causal inferences.<sup>10,11</sup> Are people happier and healthier due to the proximity of green space to their homes, or do healthier people move to greener areas? Such selective migration might result from people who are already more physically active moving to areas that provide exercise opportunities,<sup>13</sup> or the higher incomes of people with good mental health<sup>14</sup> enabling them to pay higher housing costs in greener areas.<sup>15</sup>

Recent analysis of repeated measures data from the British Household Panel Survey (BHPS) has begun to address these

possibilities. Urban green space was shown to be positively associated with better mental health measured by the General Health Questionnaire (GHQ), using fixed effects (FE) regression, which controls for time-invariant factors such as personality.<sup>16</sup> Although this finding is encouraging for the hypothesis that living in a greener areas aids mental health, the analysis was unable to comment on the progress of mental health over time following changes in residential area green space. The current paper uses the same longitudinal data set to address this gap.

Take, for example, someone moving from an urban area with little green space to one with a lot of green space. Although their mental health may be better, on average, across the years following the move, this average improvement may reflect a number of possible temporal processes. First, there may be initial improvement in mental health, followed by a decrease in benefits as individuals adapt to their new greener surroundings and the novelty wears off—an *adaptation hypothesis*. Under this possibility the higher overall average is due only to an increase in the first couple of years. Alternatively, there may be little initial benefit from moving because, for instance, it takes time

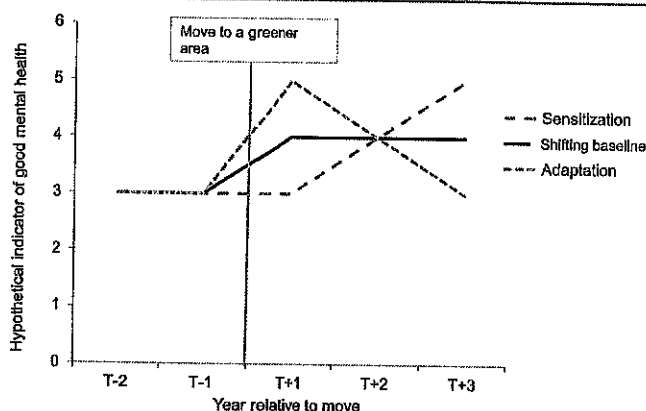
Received: August 20, 2013

Revised: December 3, 2013

Accepted: December 9, 2013

Published: December 9, 2013

to get to know where local parks are and to begin to use them. Only as these new opportunities are taken up does mental health improve gradually—a *sensitization hypothesis*. In this case the higher overall average is only due to later years. Finally, mental health may improve directly following a move to a greener area and remain at a similar heightened level thereafter—an immediately *shifting baseline hypothesis*. Figure 1 presents graphical representations of these three theoretical



**Figure 1.** Three hypothetical temporal patterns in mental health improvement following moves to greener urban areas. Note: T-1 and T+1 are annual data collection time points immediately prior to and succeeding the time of the move to a greener area. T-2 is the annual data collection time point preceding T-1, and T+2 and T+3 are the annual data collection time points succeeding T+1.

possibilities. Of note, the 3 year mean level of well-being postmove is equivalent in each scenario despite the different underlying processes.

Investigating these possibilities is relevant because mental wellbeing trajectories matching all three processes have been identified following other life events using longitudinal data sets.<sup>17,18</sup> For instance, *adaptation*, (i.e., full or partial return to baseline quality of mental health), has been found following both positive life events such as getting married<sup>19</sup> and achieving promotion,<sup>20</sup> and negative events such as needing regular medical treatment,<sup>21</sup> or becoming divorced.<sup>22</sup> The frequency with which this phenomenon is observed has led some researchers to suggest that people have a “set point” level of mental well-being which they tend to return to fairly quickly after either a positive or negative perturbation (see ref 17 for discussion). *Sensitization*, (i.e., gradual change in mental health over time in reaction to a stimulus), has also been found following positive events, including windfalls from small lottery wins,<sup>23</sup> and negative circumstances such as environmental noise.<sup>24</sup> Finally, a *shifting baseline*, (i.e., a relatively swift but stable alteration to a new state of mental health), has also been found following both negatives events such as unemployment,<sup>25</sup> and positive interventions such as cognitive-behavioral therapy for people with moderate-to-mild depression.<sup>26</sup>

Knowing which of these three processes is at work is important for at least two reasons. First, around 10% of households in most OECD countries, and 20% in the U.S. and Nordic countries have relocated within the last two years, and thus issues of home relocation are pertinent to millions of people annually.<sup>27</sup> Second, the theoretical patterns of how mental health may be affected by moves to greener/less green urban areas have different implications for planning policies interested in improving population well-being through environ-

mental interventions. Support for the adaptation hypothesis, for instance, would suggest that benefits from introducing new urban parks may be short-lived, whereas support for the alternative hypotheses would suggest more sustainable benefits. To investigate which of these theoretical temporal patterns in mental health is associated with moving to greener/less green urban areas, we used GHQ data from five consecutive annual survey waves of the BHPS, including two years before, and three years after, residential area relocation.

## ■ MATERIALS AND METHODS

**Samples.** Adult samples were drawn from the BHPS, a nationally representative longitudinal survey of over 5000 UK households that ran annually from 1991 to 2008.<sup>28</sup> The analyses investigated GHQ scores of two subsets of respondents: those who moved to greener urban areas, and those who moved to less green urban areas. Estimation samples were limited to English residents, and BHPS respondents from Wales, Scotland, and Northern Ireland were excluded, as data on local area green space was from a database which covered only English residential areas. Relocations were also restricted to those within urban areas to avoid confounding green space with urbanity.<sup>29</sup> Analyses used balanced panels with full data for six consecutive data waves, where the first three waves were in one location, and the last three were in the other. The six waves may come from any six-year period in the panel, ranging from 1991–1996 to 2003–2008. Where a panel member had data from more than one series of six waves, only the earliest was included in our samples. Observations from only five of these six years were analyzed in our models (see below).

The analyses used balanced panels, as this gave continuous data for testing hypotheses about stability over time and a high degree of certainty that all relocation events within these periods were accounted for. Although it is conceivable that relocations both away from, and immediately back to, an area might have occurred between two data collection wave points, bias from such rare events is likely to be negligible. We restricted the time range to six years because further extensions resulted in substantial reduction in sample size due to item nonresponse on predictors and panel attrition. These inclusion criteria resulted in samples of 594 movers from areas of less to more urban green space (2970 observations), and 470 movers from more to less green space (2350 observations).

We used “T” to denote the time of the relocation, and “T-1” and “T+1” to denote the annual data collection waves immediately before and after relocation. The second wave in the series of six (“T-2”) was defined as the baseline (reference) year against which GHQ scores at subsequent annual data collection waves (“T-1”, “T+1”, “T+2”, “T+3”) were compared. There is approximately one calendar year between T-1 and T+1, and home relocation might have occurred at any time during this period. The first wave (“T-3”) served to establish a consistency of location prior to T-2, ensuring that mental health in the baseline year is not itself a direct reaction to a relocation immediately before the baseline wave. We did not, however, include results from this first wave in our analysis.

**Measures. Mental Health.** Mental health was measured with the short-form twelve item General Health Questionnaire (GHQ), a self-report instrument used to aid diagnosis of disorders such as anxiety and depression.<sup>30</sup> Respondents report how they have felt in the “past few weeks” compared to “usual” for six positive mood states, such as being able to concentrate and make decisions, and six negative mood states, such as



Table 1. Descriptives for the Sample of 594 Individuals Who Moved to Greener Urban Areas<sup>a</sup>

	Time (year) relative to move time (T)				
	T-2	T-1	T+1	T+2	T+3
	mean (SD) or percentage	mean (SD) or percentage	mean (SD) or percentage	mean (SD) or percentage	mean (SD) or percentage
GHQ (inverse)	9.78 (3.21)	9.88 (3.03)	10.10 (3.00)	10.09 (3.09)	10.10 (2.92)
Area Level Variables					
% green space	58.01 (16.06)		74.08 (13.34)		
% water	1.77 (6.58)		1.07 (3.07)		
income deprivation	0.18 (0.13)		0.14 (0.11)		
employment deprivation	11.92 (7.96)		9.71 (6.80)		
education deprivation	25.28 (19.37)		20.29 (19.11)		
crime deprivation	0.32 (0.75)		-0.02 (0.74)		
Individual Level Variables					
age, years	38.87 (15.16)				
age category					
age under 36	56.06%	54.04%	50.51%	45.79%	42.09%
age 36–55	26.60%	28.11%	30.30%	33.84%	36.36%
age over 55	17.34%	17.85%	19.19%	20.37%	21.55%
diploma/degree level qualification	41.08%	41.75%	42.93%	44.61%	45.79%
married/living with partner	74.07%	75.08%	77.78%	78.62%	77.95%
living with children	38.22%	41.41%	45.45%	47.64%	48.65%
log of indexed net adjusted income	10.00 (0.60)	10.05 (0.56)	10.05 (0.66)	10.07 (0.56)	10.08 (0.53)
with work limiting health	10.27%	10.77%	10.77%	11.28%	14.14%
Labor Market Status					
employed/self-employed	72.90%	73.40%	70.03%	69.70%	70.37%
unemployed/long-term sick	5.72%	5.89%	6.40%	5.72%	4.88%
retired	10.61%	10.10%	12.46%	14.48%	14.81%
in education/training	1.52%	0.84%	0.67%	0.84%	0.67%
family carer	9.26%	9.76%	10.44%	9.26%	9.26%
Household Residence Type					
detached house	10.77%	11.62%	26.77%	28.11%	26.77%
semidetached	32.32%	32.49%	37.54%	37.71%	38.55%
terraced	36.36%	35.86%	21.04%	19.53%	20.03%
flat	19.70%	19.53%	13.30%	11.95%	11.95%
other, e.g., bedsit, sheltered	0.84%	0.51%	1.35%	2.69%	2.69%
Household Space					
<1 room/person	6.06%	7.24%	3.70%	4.71%	5.72%
1–<3 rooms/person	81.31%	81.65%	80.64%	81.31%	80.98%
3–>3 rooms/person	12.63%	11.11%	15.66%	13.97%	13.30%
Commuting Time					
noncommuters	29.97%	29.29%	31.65%	32.83%	32.49%
15 min and less	31.99%	32.15%	31.99%	29.97%	30.47%
>15–30 min	22.56%	23.40%	19.70%	20.88%	21.72%
>30–50 min	9.09%	8.75%	9.26%	9.43%	8.08%
over 50 min	6.40%	6.40%	7.41%	6.90%	7.24%

<sup>a</sup>Note: T-1 and T+1 are annual data collection time points immediately prior to and succeeding the time of the move to a greener area. T-2 is the annual data collection time point preceding T-1, and T+2 and T+3 are the annual data collection time points succeeding T+1.

feeling under strain and lacking confidence. The dependent variable is GHQ Score, where item responses indicative of distress score 1, and responses indicative of limited or no distress score 0, and these are summed to give a scale score between 0 and 12. Scale scores were reverse coded in the analysis (i.e., Inverse GHQ) so that higher scores represented better mental health.

**Green Space.** We identified two categories of individual: (a) those who relocated to greener areas, and (b) those who relocated to less green areas, and examined the mental health of these groups before and after their moves; (individuals moving only *within* a residential area are excluded from both samples).

The level of greenness around their pre- and postmove homes was derived from the Generalized Land Use Database for England (GLUD),<sup>31</sup> as in earlier research in the UK.<sup>8,16,32,33</sup> GLUD classification of high resolution land parcels was distributed to 32 482 lower-layer super output areas (LSOAs) across England, each encompassing approximately 1500 residents (mean area c.4 km<sup>2</sup>). Land use is divided into nine categories: green space; domestic gardens; water; domestic buildings; nondomestic buildings; roads; paths; railways; and other (largely hard standing) and area cover was accurate to approximately 10 m<sup>2</sup> at the time the data were collected (2005). For current purposes we defined “green space” as the

Table 2. Descriptives for the Sample of 470 Individuals Who Moved to Less Green Urban Areas<sup>a</sup>

	time (year) relative to move time (T)				
	T-2	T-1	T+1	T+2	T+3
	mean (SD) or percentage	mean (SD) or percentage	mean (SD) or percentage	mean (SD) or percentage	mean (SD) or percentage
GHQ (inverse)	10.15 (2.93)	9.84 (2.96)	9.99 (3.07)	10.13 (3.02)	10.24 (2.80)
Area Level Variables					
% green space	74.13 (13.67)		59.21 (15.01)		
% water	1.45 (3.40)		2.11 (9.54)		
income deprivation	0.15 (0.11)		0.16 (0.12)		
employment deprivation	10.15 (6.20)		10.68 (7.13)		
education deprivation	21.47 (18.33)		21.74 (19.22)		
crime deprivation	0.08 (0.76)		0.12 (0.79)		
Individual Level Variables					
age, years	37.28 (15.15)				
Age Category					
age under 36	58.30%	54.47%	50.64%	46.81%	43.62
age 36–55	28.51%	31.28%	33.83%	37.02%	38.72
age over 55	13.19%	14.26%	15.53%	16.17%	17.66
diploma/degree level qualification	42.98%	44.89%	46.60%	49.79%	51.91%
married/living with partner	62.55%	62.55%	70.64%	69.36%	69.36%
living with children	34.26%	33.40%	38.51%	40.21%	42.98%
log of indexed net adjusted income	10.03 (0.58)	10.00 (0.89)	10.09 (0.53)	10.09 (0.61)	10.09 (0.61)
with work limiting health	9.79%	9.36%	9.36%	9.36%	10.43%
Labor Market Status					
employed/self-employed	73.40%	75.53%	75.32%	75.96%	75.11%
unemployed/long-term sick	6.81%	5.53%	6.38%	6.17%	5.74%
retired	8.51%	9.36%	9.57%	10.21%	11.06%
in education/training	3.62%	2.13%	0.85%	0.85%	1.06%
family carer	7.66%	7.45%	7.87%	6.81%	7.02%
Household Residence Type					
detached house	22.77%	23.83%	22.34%	22.77%	22.55%
semidetached	34.68%	32.77%	34.04%	32.77%	32.98%
terraced	24.04%	23.83%	26.81%	28.72%	30.21%
flat	17.66%	17.87%	13.83%	13.83%	12.55%
other, e.g., bedsit, sheltered	0.85%	1.70%	2.98%	1.91%	1.70%
Household Space					
<1 room/person	9.36%	8.51%	3.40%	3.40%	4.26%
1–<3 rooms/person	77.02%	75.96%	80.21%	79.79%	79.79%
3→3 rooms/person	13.62%	15.53%	16.38%	16.81%	15.96%
Commuting Time					
noncommuters	25.74%	25.96%	25.96%	26.17%	27.23%
15 min and less	35.32%	34.04%	31.70%	33.40%	31.06%
>15–30 min	22.55%	22.55%	25.32%	23.40%	24.04%
>30–50 min	8.94%	8.72%	9.57%	10.64%	10.64%
over 50 min	7.45%	8.72%	7.45%	6.38%	7.02%

<sup>a</sup>Note: T-1 and T+1 are annual data collection time points immediately prior to and succeeding the time of the move to a less green area. T-2 is the annual data collection time point preceding T-1, and T+2 and T+3 are the annual data collection time points succeeding T+1.

percentage of land cover accounted for by “green space” and “gardens” combined. Excluding gardens produced nearly identical categorization of individuals.

On average, LSOA green space rose from 58.01% (SD = 16.06) to 74.08% (SD = 13.34) for individuals moving to greener areas, and fell from 74.13% (SD = 13.67) to 59.21% (SD = 15.01) for those moving to less green areas. The almost perfectly inverse nature of the average change in the groups is important when comparing the two patterns. The independent variable of interest in our analyses was time in relation to green space change event (home relocation). In contrast to previous work on green space and GHQ using the BHPS,<sup>16</sup> the current

analysis does not estimate the effect of a percentage point difference in urban residential green space on GHQ.

**Independent Control Variables.** Area level covariates included four LSOA socio-economic deprivation statistics derived from the English Indices of Deprivation: income deprivation, based on social benefit data (higher scores indicate less deprivation); employment deprivation, based on unemployment data (higher scores indicate less deprivation); education deprivation, based on school performance, participation in higher education and working age adult qualifications (higher scores indicate less deprivation); and finally the crime rate index, based on the number of reported crimes (higher



**Table 3. Fixed Effects Analyses Predicting Inverse GHQ for Urban Residents Moving to Another Urban Area with Higher or Lower Amounts of Greenspace, From Time Relative to Move and Key Area and Individual Level Socio-Demographic Variables**

	movers to greener urban areas			movers to less green urban areas				movers to greener urban areas			movers to less green urban areas		
	coef.	SE	p	coef.	SE	p		coef.	SE	p	coef.	SE	p
Year Relative to Move: Reference 2 Years Premove (T-2)													
1 year premove (T-1)	0.119	0.141	.399	-0.341	0.158	.031	Labor Status: Reference Employed/ Self-Employed						
1 year postmove (T+1)	0.369	0.152	.015	-0.123	0.165	.456	in education/ training	0.300	0.731	0.681	0.456	0.568	0.423
2 years postmove (T+2)	0.378	0.158	.016	0.027	0.169	.871	family carer	-0.556	0.389	0.153	-0.430	0.516	0.405
3 years postmove (T+3)	0.431	0.162	.008	0.163	0.175	.354	Household Residence Type: Reference Detached House						
Area Level Variables							semidetached	0.035	0.193	0.854	0.027	0.205	0.897
income	0.764	1.847	0.679	0.968	2.104	0.646	terraced	-0.159	0.230	0.489	-0.198	0.240	0.410
employment	0.004	0.025	0.880	-0.050	0.034	0.142	flat	0.079	0.273	0.772	0.305	0.282	0.280
education	-0.016	0.008	0.036	0.007	0.009	0.441	other, e.g., bedsit, sheltered	-0.011	0.497	0.983	0.611	0.544	0.262
crime	0.120	0.131	0.357	0.094	0.148	0.527	Household Space <sup>d</sup> : Reference 1-<3 Rooms/ Person						
Individual Level Variables							<1 rooms/ person	0.137	0.286	0.633	0.253	0.337	0.452
Age: Reference 16-35 yrs							3-3rooms/ person	-0.034	0.223	0.879	-0.115	0.236	0.626
36-55 yrs	-0.275	0.277	0.321	0.398	0.307	0.195	Commuting: Reference Noncommuters						
55+ yrs	-0.519	0.573	0.365	0.574	0.644	0.372	15 min and less	0.147	0.331	0.656	0.522	0.413	0.206
diploma/degree level qualified	-0.064	0.465	0.891	-0.644	0.389	0.098	>15-30 min	0.100	0.338	0.768	0.205	0.413	0.620
married/living with partner	0.074	0.252	0.770	0.091	0.238	0.703	>30-50 min	0.179	0.373	0.631	0.410	0.453	0.366
living with children <sup>a</sup>	-0.288	0.247	0.245	-0.454	0.296	0.126	over 50 min	0.018	0.396	0.964	0.475	0.480	0.323
household income <sup>b</sup>	0.163	0.156	0.298	0.105	0.130	0.417	constant	8.754	1.616		9.376	1.407	
with work-limiting health <sup>c</sup>	-1.051	0.271	0.000	-0.988	0.339	0.004	no. individuals/ observations			594/2970			470/2350
Labor Status: Reference Employed/ Self-Employed							model R <sup>2</sup>		0.05			0.04	
unemployed/ long-term sick	-1.075	0.438	0.014	-1.793	0.483	0.000	"Limited to respondents own children under 16 years old. <sup>b</sup> Log of indexed net household income, adjusted for household composition.						
retired	-0.329	0.474	0.487	0.204	0.726	0.778	<sup>c</sup> Health self-rated as limiting type/duration of work, including in the home; imputed from adjacent wave values for two waves lacking this variable. <sup>d</sup> Excludes kitchens and bathrooms.						

<sup>a</sup>Limited to respondents own children under 16 years old. <sup>b</sup>Log of indexed net household income, adjusted for household composition. <sup>c</sup>Health self-rated as limiting type/duration of work, including in the home; imputed from adjacent wave values for two waves lacking this variable. <sup>d</sup>Excludes kitchens and bathrooms.

scores indicate more deprivation).<sup>34</sup> As with the area green space measure used to define the samples, area level control data were collected in 2004/2005 and distributed to observations in all panel waves.

Individual level control variables were included to account for time-varying factors related to wellbeing:<sup>35</sup> age category; education (being diploma/degree level qualified); marital status (married/living with partner); living with children; household income (log of net household income in the preceding 12 months adjusted for household composition and indexed to January 2010 prices<sup>36</sup>); work-limiting illness (including work in the home); labor market status (employed/self-employed, unemployed, retired, in education/training, family carer); residence type (detached, semidetached, terraced, flat, other); household space (rooms/person ratio); and commuting time (minutes).

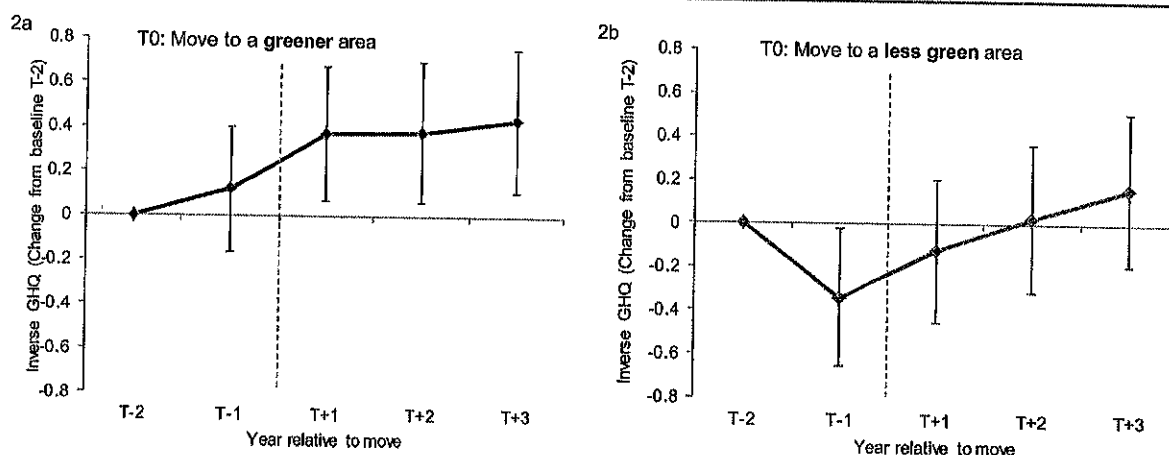
Although the BHPS did collect data on an individual's stated motivations for a home relocation, of obvious relevance here, there are several reasons why we do not include this variable in our models. First, the reason given for the "move" between T-1 and T+1 would be the same at all time points and thus, as with gender and ethnicity, there is no heterogeneity within individuals over time and thus move motive cannot be modeled in a fixed effects analysis. Second, an alternative stratification

approach, modeling people with different reasons separately, was infeasible because there were 43 separate codes (e.g., "moved in with friends"; "wanted better accommodations") and each individual could select more than one, rendering both very small samples and a lack of clarity about the relative role of different motives. Nevertheless, given the obvious importance of this issue data on move motive are discussed in the Results section to provide some indication as to whether they differed across our two samples.

**Analytic Approach.** FE regressions were conducted using the xt suite of functions in STATA 12 software. Due to the longitudinal nature of the data, we were able to estimate the effects of time relative to move events while controlling for changes in other circumstances such as income, employment and marital status that may occur at the same time as the move or at other points during the period, and for time-invariant factors such as personality. The basic models can be expressed as:

$$GHQ_{it} = \alpha_i + \beta year_{it} + \gamma \chi_{it} + \gamma Z_{it} + \varepsilon_{it}$$

Where  $GHQ_{it}$  is a measure of individual  $i$ 's GHQ score at time  $t$ ,  $\alpha_i$  is the unobserved individual level component,  $year_{it}$  is the year relative to move for individual  $i$ , and  $\chi$ , and  $Z$  are sets of individual and area level control variables respectively.



**Figure 2.** Changes in (inverse) GHQ scores compared to baseline (T-2) following relocations to (a) greener urban areas and (b) less green urban areas (error bars = 95% CIs). Note: T-1 and T+1 are annual data collection time points immediately prior to and succeeding the time of the move to a greener/less green area (T0). T-2 is the annual data collection time point preceding T-1, and T+2 and T+3 are the annual data collection time points succeeding T+1.

Coefficients thus represent the scale point difference in the dependent variable given a scale point increase, or a category change from the reference, in the independent variable, when other independent variables are held constant, controlling for fixed individual differences.

Monitoring mental health for two waves before relocation allowed us to examine potential anticipation effects whereby changes in mental health occur in anticipation of a change (e.g., excitement at moving to a greener area, or sadness at the thought of moving to a more built up area). Such effects have been shown for marriage and divorce, for instance.<sup>17</sup> Monitoring mental health for three waves after relocation enabled us to determine whether changes in mental health reflected processes of adaptation, sensitization or shifting baselines.

## RESULTS

**Descriptives.** There were some differences in the two groups of movers (Tables 1 and 2). For instance, on average, movers to greener areas were slightly older at T-2 ( $M = 38.87$ ;  $SD = 15.16$ ) than movers to less green areas ( $M = 37.28$ ,  $SD = 15.15$ ), more likely to be married (74.07% vs 62.55%), more likely to be retired (10.61% vs 8.51%), less likely to live in a detached house (10.77% vs 22.77%), and more likely to be noncommuters (29.97% vs 25.74%). Movers to greener areas, who were currently living in less green areas, also had lower mean (inverse) GHQ scores at T-2 (9.78) than movers to less green areas, who were currently living in more green areas, (10.15). This baseline difference reflects previous findings of better mental health in greener urban areas. Intriguingly, mean GHQ for movers to greener areas at T+3 was 10.10, that is, almost identical to mean GHQ at T-2 for movers to less green areas (10.15). Notably, at these points in time both groups were living in areas with near identical mean green space cover (74.08% postmove for the group moving to greener areas, and 74.13% premove for the group moving to less green areas).

There was little change in the means and proportions of some of the control variables over time for both groups (Tables 1 and 2). For example, income, labor market status, household space and commuting time are relatively stable. Other factors did vary over the period. Both groups show increases in the proportions married, highly qualified, living with children and in older age categories, and, among movers to greener areas

only, with work-limiting health. House type also shows change over time in both samples. These descriptive trends underline the importance of controlling on these factors in the estimation of the effects of time relative to relocation.

Importantly, move motives were highly similar across the two samples (Supporting Information Table S1). By far the most frequent motive was “larger accommodation” ( $n = 254$ ), stated by 25.6% of those who moved to a greener area and 21.7% of those who moved to a less green area. Among movers to greener areas, only 4 respondents indicated that area greenness was a reason for the relocation though a few did include factors such as noise ( $n = 11$ ) and traffic ( $n = 4$ ), both of which may be related to local area green space. Again, though, these motives were present in similarly low frequencies among movers to less green areas ( $ns = 4, 4$ , and 2 respectively). Thus not being able to include motives in our regression estimations does not seem to have been an important problem in terms of accounting for the different temporal relationships seen below.

**Regression Results.** Results of the regressions for both groups of mover are presented in Table 3 and the coefficients for our main variable of interest (i.e., year before and after home relocations) are presented in Figures 2a (movers to greener urban areas) and 2b (movers to less green urban areas). The coefficients for the control variables show that for both samples mental health was lower when individuals had work-limiting health problems and were unemployed. For movers to more green space, mental health was also lower when they lived in areas where the mean level of education was higher.

Movers to greener areas showed no difference in GHQ at T-1 compared to T-2, but then a significant improvement in mental health for each of the three years postmove (Figure 2a). Although the largest improvement was at T+3, ( $b = 0.43$ ,  $P = 0.008$ ), which might support a sensitization hypothesis, the improvement in mental health stabilized quickly postmove for the following three years. The data thus best support the immediate shifting baseline hypothesis.

Movers to less green areas showed a significant decrease in mental health at T-1 compared to T-2, ( $b = -0.34$ ,  $P = 0.031$ ), but no significant differences for the three years postmove. That is, people have apparently adapted fairly rapidly to living in a less green area (Figure 2b).



## DISCUSSION

This study aimed to explore the longitudinal effects of changes in environmental green space on mental health through examination of the impact of home relocation to a greener (or less green) urban area. Previous cross-sectional work suggested mental health is better in greener urban areas,<sup>5,6</sup> and previous estimates from within-individual differences showed that 'on average' mental health improved during years of residence in greener areas.<sup>16</sup> However, this average could reflect a range of different temporal patterns following changes in residential area green space which have different implications for environmental urban design and land use policy. Take the case of relocation to a greener urban area. There may be an initial peak in mental health following the move to a greener area before adaptation takes place and people return to premove levels (i.e., the adaptation hypothesis). Such a process implies time-limited benefits from urban green space development. Alternatively, it may take time to accrue the mental health benefits from moving to a greener area and thus the initial years will show little immediate impact (i.e., the sensitization hypothesis). This implies that initial benefits to mental health from urban greening might be maximized when developments are accompanied by information campaigns, and health or lifestyle promotion work. Finally, the impact might be immediate and sustained, and result in a relatively rapid shift in baseline mental health after a move (i.e., the shifting baseline hypothesis). This scenario implies immediate and potentially long-lasting benefits to local residents from urban green space development. As noted earlier, all three processes have been witnessed following other life changes<sup>17–26</sup> and thus we were unable to predict, *a priori*, which pattern might explain previous green space related findings.<sup>16</sup>

Our test of these different possibilities suggested that for movers to greener areas, the shifting baseline hypothesis best fit the data (Figure 2a): Mental health improved within a year and stayed approximately the same for the following two years. Results for movers to less green areas were less straightforward (Figure 2b): The predicted decline in mental health for this group occurred before the move and was followed by rapid adaptation to the new circumstances. There are at least two possible interpretations.

First, the anticipation of moving to a less green area may have negatively impacted mental health. Such negative anticipation effects are observed preceding divorce, for instance.<sup>19</sup> Second, declines in mental wellbeing may have precipitated the moves themselves. For instance, it could be that individuals who were becoming increasingly unhappy in greener areas, perhaps due to fewer facilities or job opportunities, decided to move to less green urban areas and once they had done so their mental health improved again. Although possible, move motivations were broadly similar across the two samples and employment related reasons, for instance, were rare among movers to less green space. Thus, at least with the current data, it is difficult to offer move motivation as an explanation for the findings.

Confidence in our results comes from the negative effects on mental health of other life changes included in the analyses such as unemployment and ill-health which have also been demonstrated in previous research.<sup>16,34</sup> The negative relationship observed between area level education and mental health among movers to greener areas may reflect increased stress from living among a new peer group of higher socio-economic

status, but this is highly speculative at this stage. The relatively small samples of observations used in the regressions possibly accounts for why some control variables shown in previous work with the BHPS data set to be significantly related to GHQ, such as marital status,<sup>16</sup> were not significant in these estimations.

**Study Limitations.** First, the constraints of maintaining balanced panels and useable sample sizes restricted analyses to individuals with six years of consecutive data, limiting our ability to follow people's mental health for longer periods of time. Second, relatively small samples made stratification on other variables such as age or income problematic, which leaves open the question of whether different groups vary in their temporal responses to green space change. This issue is particularly pertinent to analysis of move motivations. Although, as noted above, we were unable to include motivations in our models, we did at least control for the main move motivation (accommodation size). Importantly, neither accommodation size nor type was significant in either model, and motivations were broadly similar across the two samples anyway suggesting that differential move motivations are not a simple explanation for the findings. Nonetheless, future research, using the far larger sample from UK's recently initiated Understanding Society panel,<sup>37</sup> will be able to overcome the issue of limited sampling and more fully explore the importance of mover motivations using stratified models.

It is also important to note that FE analysis does not permit inference to a sampled population. Furthermore, while the BHPS sample is representative of adults in the UK, no similar claim can be made about the estimation subsamples used in this research. Of particular interest is the possibility that the representativeness of the samples of movers may be affected by differential attrition. Such differential attrition may be relevant as a possible explanation for the observed absence of sustained declines in mental health among movers to less green space. For instance, it is possible that individuals whose mental health did not recover after  $T-1$  may have been more likely to become nonrespondents during  $T+1$  to  $T+3$ . Of course, it is also possible that some individuals experienced declines rather than improvements in mental health following moves to greater green space and were excluded from the estimation sample on the same grounds. Our findings are thus limited to our samples, that is, those individuals for whom we could monitor mental health over six consecutive years. Again, the much larger Understanding Society panel will enable more detailed exploration of these possibilities in the coming years, where different time periods can be explored with more reliability.

Finally, although FE estimation controls for time-invariant individual level heterogeneity (thus reducing estimation bias due to correlation between factors such as heredity and personality, and the predictor variables), the models do not control for all potentially confounding time-varying factors, and thus causality cannot be assumed. Moreover, the available covariates and their operationalization were limited by the available data. For example, while labor market status distinguished employment from unemployment and the other categories, the impact of changes in employment which might occur as a result of redundancy are not accounted for. There are many other potentially stressful and stress reducing life events which are not included in the model and further research is needed to explore these issues directly.

An important example of the limitations of how constructs are operationalized in this work is the fact that cross-sectional

estimates of area level factors (at 2005) were distributed to all waves of data (1991–2008), with no correction for changes within areas over time. We assume this to have very limited impact on our estimations, since comparative differences in environmental and socio-demographic aspects of a residential area at different times are assumed to be slight in comparison to those between different residential areas at the same, or different, times.

We were also unable to examine mechanisms that might explain how green space could improve mental well-being by, for instance, encouraging greater levels of physical activity or promoting better neighborhood relations. Furthermore, it was assumed that area level green space is related to individual exposure: we distributed the community level variable to the individuals in the sample. Thus, again, further work is needed to look at longitudinal trends in potential mechanisms and to better quantify individual level green space exposure among large samples. One possibility would be to compare our findings with those from large-scale “natural experiments”<sup>38</sup> where the mental health and physical activity, for instance, of local populations is monitored before and after changes in local green space (e.g., creation of new parks). Such an approach would also be better able to operationalize individual level green space exposure in terms of both plot size (e.g., comparing one large park vs several smaller parks within a local area) and quality (e.g., design attributes, habitat type, and biodiversity).

**Implications.** While acknowledging these limitations, our results may nevertheless aid policy makers and urban planners interested in exploring whether “green infrastructure,”<sup>39</sup> such as parks and green corridors, produces mental health benefits to local populations. Unlike many other changes in life circumstances, where effects on mental health can be short-lived, moving to a greener urban area was associated with sustained mental health gains. Further work is needed to examine why these effects occur and just how long they may last, and also why the reverse situation was not observed, that is, people who moved to less green areas did not show enduring negative impacts.

## ■ ASSOCIATED CONTENT

### ● Supporting Information

Additional information as noted in the text. This material is available free of charge via the Internet at <http://pubs.acs.org>.

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### Notes

The authors declare no competing financial interest.

## ■ ACKNOWLEDGMENTS

The European Centre for Environment and Human Health, part of University of Exeter Medical School, is supported by investment from the European Regional Development Fund 2007–2013 and the European Social Fund Convergence Programme for Cornwall and the Isles of Scilly. This work was supported by the Economic and Social Research Council (grant number ES/K002872/1). Neither the BHPS data collectors nor the UK Data Archive bear any responsibility for the analyses or interpretations presented here. We would also like to thank the Editor and three anonymous reviewers for

their insightful suggestions on a previous version of this manuscript.

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# SCIENTIFIC REPORTS

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## Neighborhood greenspace and health in a large urban center

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Received: 08 February 2015

Accepted: 01 June 2015

Published: 09 July 2015

Studies have shown that natural environments can enhance health and here we build upon that work by examining the associations between comprehensive greenspace metrics and health. We focused on a large urban population center (Toronto, Canada) and related the two domains by combining high-resolution satellite imagery and individual tree data from Toronto with questionnaire-based self-reports of general health perception, cardio-metabolic conditions and mental illnesses from the Ontario Health Study. Results from multiple regressions and multivariate canonical correlation analyses suggest that people who live in neighborhoods with a higher density of trees on their streets report significantly higher health perception and significantly less cardio-metabolic conditions (controlling for socio-economic and demographic factors). We find that having 10 more trees in a city block, on average, improves health perception in ways comparable to an increase in annual personal income of \$10,000 and moving to a neighborhood with \$10,000 higher median income or being 7 years younger. We also find that having 11 more trees in a city block, on average, decreases cardio-metabolic conditions in ways comparable to an increase in annual personal income of \$20,000 and moving to a neighborhood with \$20,000 higher median income or being 1.4 years younger.

Many have the intuition that living near trees and greenspace is beneficial to our health. But how much could a tree in the street or a nearby neighborhood park improve our health? Here we set out to examine this very question by studying the relationship between health and neighborhood greenspace as measured with comprehensive metrics of tree canopy on the street vs. tree canopy in parks and private residences.

It is a known fact that urban trees improve air quality<sup>1,2</sup>, reduce cooling and heating energy use<sup>3</sup>, and make urban environments aesthetically more preferable<sup>4,5</sup>. Importantly, several studies have shown that exposure to greenspaces can be psychologically and physiologically restorative by promoting mental health<sup>6,7</sup>, reducing non-accidental mortality<sup>8</sup>, reducing physician assessed-morbidity<sup>9</sup>, reducing income-related health inequality's effect on morbidity<sup>10</sup>, reducing blood pressure and stress levels<sup>11,12</sup>, reducing sedentary leisure time<sup>13</sup>, as well as promoting physical activity<sup>14,15</sup>. In addition, greenspace may enhance psychological and cardio-vascular benefits of physical activity, as compared with other settings<sup>12</sup>.

Moreover, experimental research has demonstrated that interacting with natural environments can have beneficial effects – after brief exposures – on memory and attention for healthy individuals<sup>16–18</sup> and for patient populations<sup>19–21</sup>. In addition, having access to views of natural settings (e.g., from a home or a hospital bed) have been found to reduce crime and aggression<sup>22,23</sup> and improve recovery from surgery<sup>24</sup>.

Although many studies have shown that natural environments enhance health or encourage healthy behaviors, to our knowledge, fewer studies have quantified the relationship between individual trees and health. In addition, studies have not separately estimated the treed area beside the streets and other urban greenspaces and related those variables to individuals' health in various domains, including

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cardio-metabolic conditions, mental disorders and general health perception. Knowing the kind of greenspace that may be associated with health benefits would be critical when deciding the type of greenspace that should be incorporated into built environments to improve health.

The typical method for quantifying exposure to greenspace for individuals in large population studies is to use the percentage of area covered in greenspace in an individual's neighborhood. The size of the areas and the accuracy (and also definition) of greenspace quantification vary across different studies. For example<sup>10</sup>, used data containing  $>10\text{ m}^2$  accuracy for greenspace and geographical units of  $4\text{ km}^2$  on average in their study, Richardson *et al.* (2013) used  $>200\text{ m}^2$  accuracy for greenspace and geographical units that averaged  $5\text{ km}^2$ , and<sup>7</sup> used the presence of public "natural" spaces in areas within a  $5\text{ km}$  radius from schools to quantify exposure to nature for school-aged children.

In this study, we were interested in examining greenspace with lower granularity (i.e., higher geographical resolution) and quantifying associations that are specific to exposure to trees, as opposed to exposures to any greenspace, such as grass or shrubbery. Here, our definition of greenspace consisted of tree canopy only and not of urban grass or bushes (or other "natural" settings). This choice is based on the assumption that trees are the most consistent green components in an area and potentially the most important component for having beneficial effects<sup>25</sup>.

We also used a much higher geographical resolution for the following reasons. First, we wanted to distinguish between trees along the roads and streets versus those in domestic gardens and parks, and other open areas. To do so, we used individual tree data from the 'Street Tree General Data' and tree-canopy polygon data from the 'Forest and Land Cover' dataset to construct our greenspace variables. Both datasets came from the city of Toronto. Second, to ensure that the tree variables were less confounded by health insurance policies as well as demographic parameters (age, sex, education, and income), we used a single urban population (Toronto) in Canada, a country with a universal publically funded healthcare system that, compared with the United States, guarantees access to health-care services independent of income and/or employment status<sup>26</sup>. These health-care equalities facilitate the interpretation of the relationships between individual urban trees and health in this urban population. Although financial barriers may not impede access to health care services in Canada, differential use of physician services with respect to socio-economic status persist; Canadians with lower incomes and fewer years of schooling visit specialists at a lower rate than those with moderate or high incomes and higher levels of education despite the existence of universal health care<sup>27</sup>. In particular, we examined the relationship between tree canopy density beside the streets and in other areas such as parks and domestic gardens with an individual's health. The health variables that we focused on were: 1) Overall health perception; 2) Presence of cardio-metabolic conditions such as hypertension, high blood glucose, obesity (both overweight and obese), high cholesterol, myocardial infarction, heart disease, stroke, and diabetes; and 3) Mental health problems including major depression, anxiety, and addiction. Subjective self-rated health perception was chosen as one of the health outcomes because self-perception of health has been found to be related to morbidity and mortality rates and is a strong predictor of health status and outcomes in both clinical and community settings<sup>28–30</sup>.

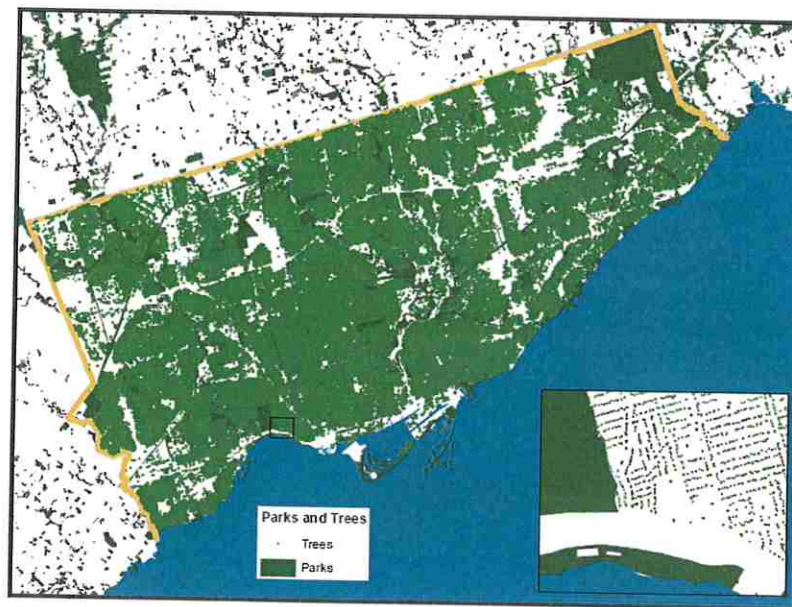
Furthermore, on the tree variable side, we distinguished tree canopy of trees beside the street from those planted in other areas, such as parks and private backyards. A distinction of these different sources of tree canopy may be helpful for urban planning policies. We hypothesized that street trees could have stronger beneficial associations with individual's health because they may be more accessible to all residents in a given neighborhood as residents are likely exposed to street trees in their daily activities and through views from their windows; for example see<sup>24</sup>.

Figure 1 shows a geographic map of the individual tree data (i.e., the individual trees on the street) and Fig. 2 shows a geographic map of the satellite tree data (i.e., the amount of tree canopy) for different neighborhoods in the city of Toronto. Both tree datasets were used to quantify the "greenness" of the neighborhoods (see Methods). Figure 3 shows the dissemination areas (i.e., Toronto neighborhood units) that were used in our analysis. The highlighted neighborhoods are the ones that were included in our analysis.

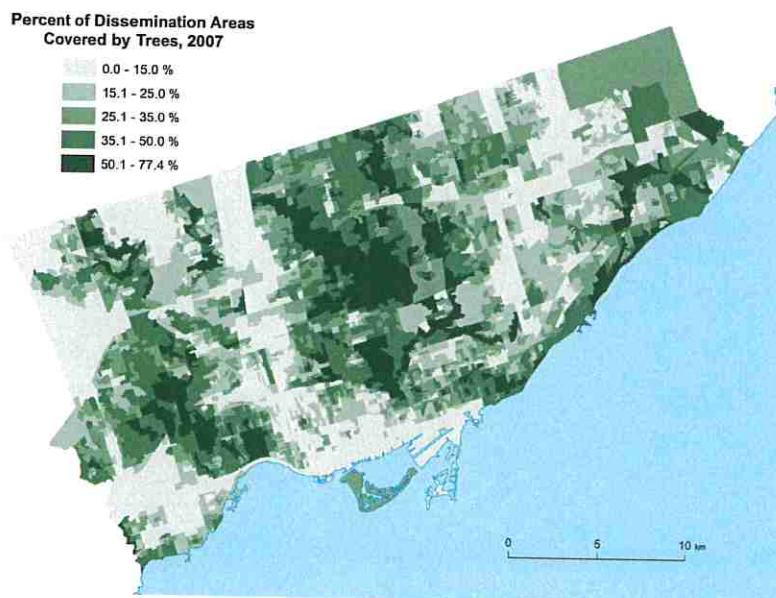
To uncover the relationships between neighborhood greenspace and health we performed two analyses. The first was a multiple regression of each health outcome on socio-economic, demographic and tree density variables. The second was a canonical correlation analysis where we examined the multivariate relationship between *all* health outcomes and socio-economic, demographic and tree density variables. Our canonical correlation model is shown in Fig. 4. In all of these analyses we attempted to quantify the independent relationships of street tree canopy and non-street tree canopy on health.

## Results

**Regression Results. Health Perception.** Our results suggest that people who live in areas that have more (and/or larger) trees on the streets report better health perception, after controlling for demographic factors, such as income, age and education [ $p < 0.0001$ ]. As can be seen in Table 1, the regression coefficient for the street tree density variable shows that a four percent square meters ( $400\text{ cm}^2$ ) increase in the treed area for every square meter of neighborhood predicts about 0.04 increased health perception (i.e., 1% of our 1–5 health perception scale) for individuals living in that area. A  $400\text{ cm}^2/\text{m}^2$  increase in treed area is equal to the addition of about 200 average trees (with  $40\text{ m}^2$  crown area) on the streets in a



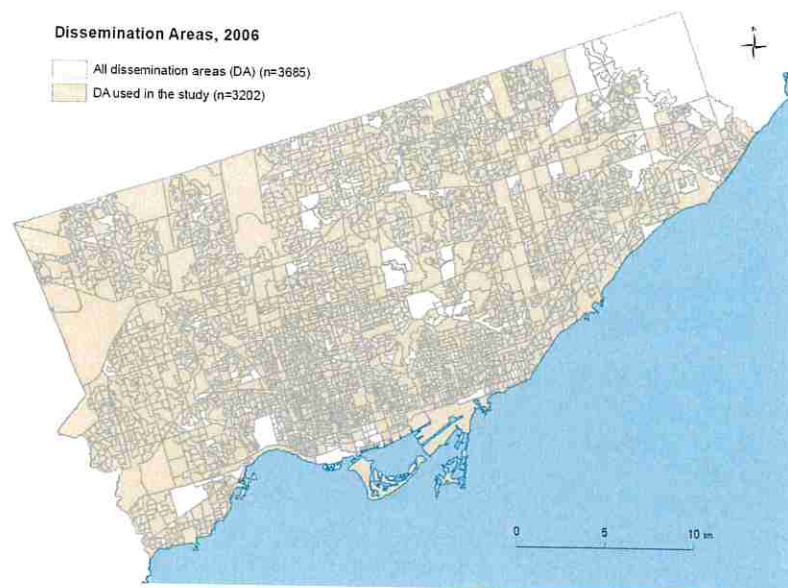
**Figure 1.** The Greenspace map of the city of Toronto constructed from the individual tree information Street Tree General Data. This image is shown in much lower resolution compared to the real image and the dissociation between individual trees and other areas is clearly perceivable for the zoomed-in area. Parks are shown in dark green. This figure was created using Environmental Systems Research Institute's (ESRI) ArcGIS software v. 10.2.



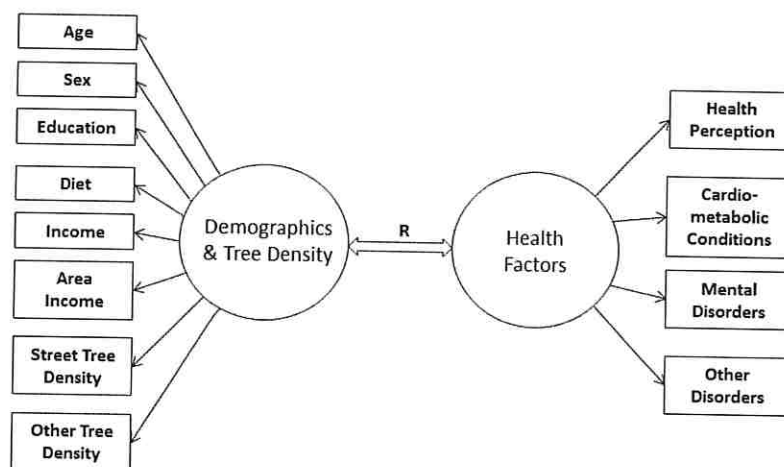
**Figure 2.** The Greenspace map of the city of Toronto constructed from the Geographical Information System (GIS) polygon data set Forest and Land Cover. The levels are shown in units of 10–15% for display purposes only as we analyzed these data as a continuous variable. This figure was created using Environmental Systems Research Institute's (ESRI) ArcGIS software v. 10.2.

dissemination area of almost average size (about 200,000 m<sup>2</sup>) in Toronto. This is approximately 10 more trees per city block (a DA usually contains about 25 blocks). As can be seen in Table 1, this increase in health perception is equivalent to the effect of a \$10,200 increase in annual household income and living in a DA with equally (i.e., \$10,200) higher median income. (Notice that for this comparison we added up the estimates of income and area income because a hypothetical increase of income for the families in a DA also increases the median area income in that DA to the same extent). This same increase in health perception is also, on average, equivalent to being 7 years younger.





**Figure 3.** The dissemination area map of the city of Toronto (2006). The colored regions show the dissemination areas that were included in the study. This figure was created using Environmental Systems Research Institute's (ESRI) ArcGIS software v. 10.2.



**Figure 4.** The canonical correspondence model that was used in our canonical correlation analyses to assess the relationship of the predictors (socio-economic, demographic and tree density variables) with health factors.

Other than street tree density, variables that independently predict better health perception in this multiple regression are: eating more servings of vegetables and fruits in one's diet (1 more serving per day predicts 1.2% better health perception [ $p < 0.0001$ ]), being younger (10 years less age predicts 1.5% better health perception [ $p < 0.0001$ ]), being male (males have on average almost 1% better health perception than females [ $p = 0.0004$ ]), having higher education (belonging to one higher educational group predicts 1.6% better health perception [ $p < 0.0001$ ]), living in more affluent neighborhoods (belonging to one higher area median income group predicts 0.7% better health perception [ $p < 0.0001$ ]), and having higher household income (belonging to one higher income group predicts 1.6% better health perception [ $p < 0.0001$ ]). It should be mentioned that the associations between health perception and tree density and other predictors reported here explain 9% of the variance in health perception. While the model explains a significant proportion of the variance in the data, it does not explain all of the variance of the dependent variable. This is true of all models whose  $R^2$  values are less than 1. As such the model's predictions may not always hold true if the other unidentified factors that predict the remaining variability in health perception are not controlled for.

Variable	Estimate	Std. Error	t-stat	p-value	df	Rel. Increase	FMI
Intercept	2.7794	0.0296	93.8319	<0.0001	6202	0.0685	0.0644
Diet	0.0481	0.0024	19.7007	<0.0001	668	0.2130	0.1781
Age	-0.0059	0.0004	-16.8734	<0.0001	10566	0.05246	0.0500
Sex	0.0374	0.0107	3.4853	0.0004	14364	0.04498	0.0432
Education	0.0663	0.0032	20.6885	<0.0001	6647	0.06620	0.0624
Income	0.0710	0.0034	21.0145	<0.0001	448	0.2630	0.2117
Area income	0.0278	0.0056	4.9162	<0.0001	3664	0.08932	0.0825
Street Tree den.	0.0101	0.0015	6.6879	<0.0001	34158	0.02915	0.0284
Other Tree den.	-0.0003	0.0004	-0.7293	0.4658	25993	0.03342	0.0324

**Table 1. Combined results of regression of health perception on the multiply-imputed data.**  $R^2 = 0.0885$ , adjusted  $R^2 = 0.0876$ ,  $F(8, 7879^*) = 94.6814$ ,  $p < 0.0001$ . FMI is fraction of missing information.

\*The average of estimated degrees of freedom.

Variable	Estimate	Std. Error	t-stat	p-value	df	Rel. Increase	FMI
Intercept	0.1236	0.0363	3.4049	0.0008	895	0.1937	0.1643
Diet	-0.0062	0.0026	-2.3217	0.0204	1206	0.1569	0.1371
Age	0.0296	0.0004	70.4279	<0.0001	1724	0.1307	0.1166
Sex	0.2894	0.0128	22.5830	<0.0001	857	0.1871	0.1596
Education	-0.0570	0.0037	-15.2098	<0.0001	553	0.2351	0.1932
Income	-0.0240	0.0038	-6.2648	<0.0001	168	0.4563	0.3213
Area Income	-0.0286	0.0066	-4.3071	<0.0001	863	0.1864	0.1591
Street Tree den.	-0.0097	0.0018	-5.4025	<0.0001	801	0.1937	0.1643
Other Tree den.	-0.0001	0.0005	-0.1196	0.9048	776	0.1970	0.1667

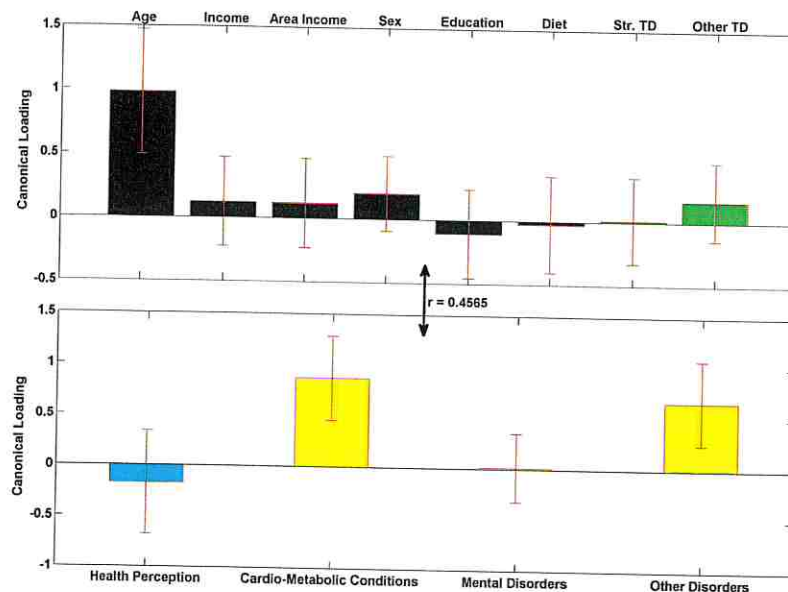
**Table 2. Combined results of regression of cardio-metabolic conditions on the multiple-imputed data.**  $R^2 = 0.1920$ , adjusted  $R^2 = 0.1845$ ,  $F(8, 871^*) = 25.6089$ ,  $p < 0.0001$ . FMI is fraction of missing information.

\*The average of estimated degrees of freedoms.

**Cardio-metabolic Conditions.** Results of regressing the Cardio-metabolic conditions index on the independent variables are shown in Table 2. Results suggest that people who live in areas that have more (and/or larger) trees on the streets report significantly fewer cardio-metabolic conditions. People reported decrease of 0.04 units of cardio-metabolic conditions (0.5% of the 0–8 scale for cardio-metabolic conditions) for every increase of 408 cm<sup>2</sup>/m<sup>2</sup> in tree density. This is approximately equivalent to 11 more average-sized trees on the streets per city block. This effect for cardio-metabolic conditions is equivalent to a \$20,200 increase in both area median income and annual household income adjusted for other variables. This decrease in cardio-metabolic conditions is also, on average, equivalent to being 1.4 years younger.

Other than street tree density, variables that predict fewer cardio-metabolic conditions, after controlling for other variables in this multiple regression, are: eating more servings of vegetables and fruits in one's diet (1 more serving per day predicts 0.08% less cardio-metabolic conditions [ $p = 0.0129$ ]), being younger (10 years less age predicts 3.7% less cardio-metabolic conditions [ $p < 0.0001$ ]), being female (females report on average 3.3% less cardio-metabolic conditions than males [ $p < 0.0001$ ]), having higher education (belonging to one higher educational group predicts 0.71% less cardio-metabolic conditions [ $p < 0.0001$ ]), living in more affluent neighborhoods (belonging to one higher area median income group predicts 0.36% higher reported health perception [ $p < 0.0001$ ]), and having higher household income (belonging to one higher income group predicts 0.28% less cardio-metabolic conditions [ $p < 0.0001$ ]). In addition, we added the interaction terms of all predictors with the tree density variables and the models  $R^2$  for health perception and cardio-metabolic conditions did not improve much ( $\Delta R^2 = 0.0008$  for health perception,  $\Delta R^2 = 0.0009$  for cardio-metabolic conditions), even though there was a small positive interaction between street tree density and age that was statistically significant. We chose not to include these interactions due to lack of a priori hypotheses, their small effect sizes and to preserve the models simplicity. Again, it should be mentioned that the associations between cardio-metabolic conditions and tree density and other predictors reported here explain 19% of the variance in cardio-metabolic





**Figure 5.** The first pair of linear composites for the canonical correlation analysis;  $F(32, 114680) = 381.2263$ ,  $R^2 = 0.2084$ ,  $p < 0.0001$ . Bars show correlation of each variable (canonical loadings) with the first set of weighted canonical scores. Error bars show  $\pm 2$  standard errors containing both between and within imputation variance calculated by bootstrapping imputed data sets. Please notice the different colors for health perception (teal) and other three health condition variables (yellow). This is to emphasize that they have different coding directions in terms of a person's well-being (more health perception is positive, more health conditions is negative).

conditions. While the model explains a significant proportion of the variance in the data, it does not explain all of the variance of the dependent variable. This is true of all models whose  $R^2$  values are less than 1. As such the model's predictions may not always hold true if the other unidentified factors that predict the remaining variability in cardio-metabolic conditions are not controlled for.

**Mental Disorders and Other Disorders.** Results of Mental Disorders and Other Disorders can be found in Supplemental Tables S1 and S2. Regressing the Mental Disorders index on the independent variables do not capture a significant amount of variance in Mental Disorders in the data [ $R^2 = 0.0136$ , adjusted  $R^2 = -0.0111$ ,  $p = 0.1820$ ]. We will further investigate this issue later in the canonical correlation analysis.

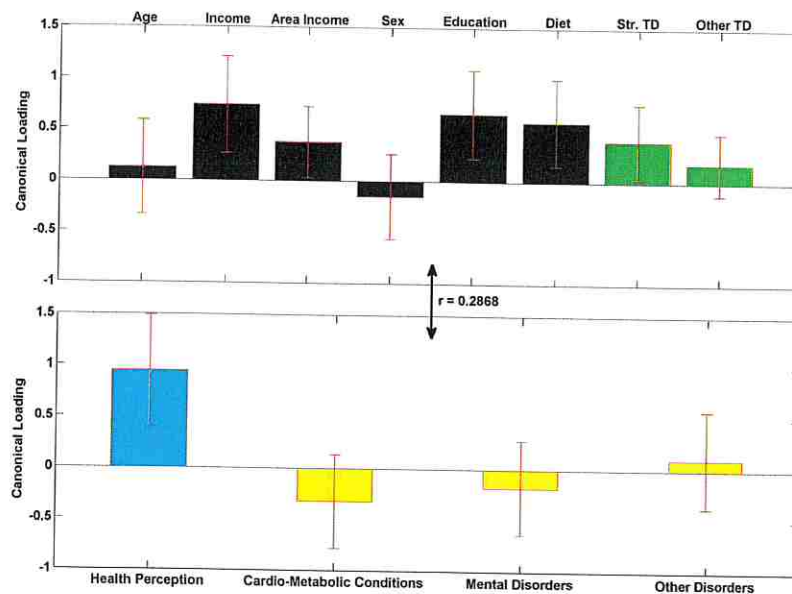
Finally, the Other Disorders index is not a coherent variable and was not constructed to be used as a dependent variable in the regression analyses, but mainly was constructed as a control variable for the canonical correlation analysis. Nonetheless, results of regressing the Other Disorders index (Cancer, Migraines, Arthritis, or Asthma) on the independent variables are shown in Table S2.

**Canonical Correlation Results.** Figures 5–7 show the results from the canonical correlation analysis, which finds the relationship (i.e., linear combination of weights) between two sets of variables. The height of each bar shows the correlation of each variable with the corresponding set of canonical weights. Error bars show  $\pm 2$  standard errors containing both between and within imputation variance calculated by bootstrapping imputed data sets. Importantly, all canonical variates are orthogonal to one another.

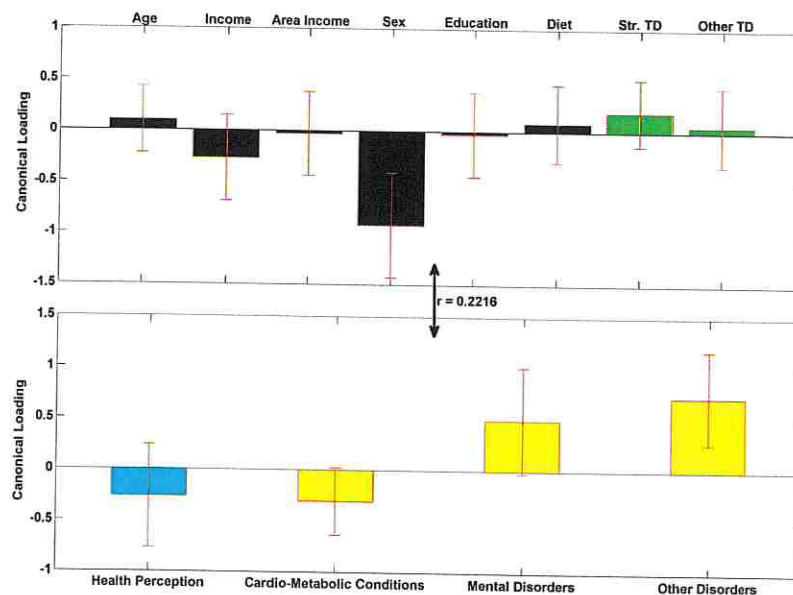
The canonical correlation coefficient ( $r$ ) for each pair of linear composites is shown near the bidirectional arrow representing the relationship between the two sets of variables (demographic and green-space variables and health-related variables). The canonical correlation coefficients for all the four pairs of linear composites were statistically significant ( $p < 0.0001$  for Bartlett's approximate chi-squared statistic with Lawley's modification).

The first pair of linear composites (Fig. 5) is dominated by the effect of age on physical disorders (Cardio-metabolic and Other disorders). This suggests that being older is highly correlated ( $r = 0.4565$ ,  $R^2 = 0.2084$ ) with having more cardio-metabolic conditions, as well as cancer, arthritis, asthma and migraines.

The second pair of linear composites is mainly dominated by Health Perception and shows that individuals with higher annual income, higher education, higher vegetables/fruits consumption and who live in areas with higher street tree density report the best health perception. This replicates and extends the results found in the regression. The same group of people also reports fewer cardio-metabolic conditions, although the errorbar for the loading of these conditions crosses zero (indicating a non-significant



**Figure 6.** The second pair of linear composites for the canonical correlation analysis;  $F(21, 89297) = 211.0480$ ,  $R^2 = 0.0822$ ,  $p < 0.0001$ . Bars show correlation of each variable with the second set of weighted canonical scores. Error bars show  $\pm 2$  standard errors containing both between and within imputation. Please notice the different colors for health perception (teal) and other three health condition variables (yellow). This is to emphasize that they have different coding directions in terms of a person's well-being (more health perception is positive, more health conditions is negative).



**Figure 7.** The third pair of linear composites for the canonical correlation analysis;  $F(12, 63702) = 139.9347$ ,  $R^2 = 0.0491$ ,  $p < 0.0001$ . Bars show correlation of each variable with the third set of weighted canonical scores. Error bars show  $\pm 2$  standard errors containing both between and within imputation variance. Please notice the different colors for health perception (teal) and other three health condition variables (yellow). This is to emphasize that they have different coding directions in terms of a person's well-being (more health perception is positive, more health conditions is negative).

effect). This is possibly due to the fact that the main part of the variability in cardio-metabolic conditions (that was mainly due to older age) was already captured by the first canonical loadings. The canonical correlation for this second linear composite is of medium size ( $r = 0.2868$ ,  $R^2 = 0.0822$ ).

Variable	Communality	Variable	Communality
Age	0.9845	Str. Tree Density	0.3980
Income	0.8158	Other Tree Density	0.1317
Area Income	0.2649	Health Perception	1.0000
Sex	0.9848	Cardio-metabolic Conditions	1.0000
Education	0.5016	Mental Disorders	1.0000
Diet	0.4372	Other Disorders	1.0000

**Table 3. Communalities for the variables based on the canonical correlation analysis.**

The third pair of linear composites has a modest effect size ( $r = 0.2216$ ,  $R^2 = 0.0491$ ) and is mainly dominated by sex. This composite shows that females report more other disorders and more mental disorders. This complies with the regression results and the fact that occurrence of breast cancer is more frequent among women even at younger ages<sup>31</sup>.

Results from the fourth composite are shown in Supplementary Figure S1. The fourth component was dominated by mental disorders after much of the variability due to sex was extracted by the previous composites (mainly third composite). Neither the demographic nor the tree density variables significantly correlated with the fourth canonical scores. The very small effect size ( $r = 0.0539$ ,  $R^2 = 0.0029$ ) shows that the data and variables might not be rich enough for an analysis of mental disorders, as mentioned before in the regression analysis. Indeed, only a non-reliable combination of demographic and tree variables seem to be related to more mental disorders at this stage of analysis. Future studies with more detailed data regarding mental disorders may help to test the results found for the fourth composite.

Finally, Table 3 shows the communalities for all the variables, which are computed as sum of the squared loadings across all latent variables and represent how much of the variance in the variable has been accounted for by the canonical correlation model. The communality results show that the canonical variates are able to capture/reproduce at least 15% of the variance in all original variables. In conclusion, both the regression and the canonical correlation analyses suggest that higher tree density on the streets, in a given dissemination area, correlates with better health perception and fewer cardio-metabolic conditions for people living in that dissemination area.

## Discussion

Results from our study suggest that people who live in areas with higher street tree density report better health perception and fewer cardio-metabolic conditions compared with their peers living in areas with lower street tree density. There are two important points about our results that add to the previous literature. First, the effect size of the impact of street tree density seems to be comparable to that of a number of socioeconomic or demographic variables known to correlate with better health (beyond age). Specifically, if we consider two families, one earning \$10,200 more annually than the other, and living in a neighborhood with the same higher median income, it is predicted that the more affluent family who is living in the richer neighborhood perceives themselves as healthier people. Interestingly, however, that prediction could turn out to be wrong if the less affluent family lives in a neighborhood that has on average 10 more trees beside the streets in every block. Regarding cardio-metabolic conditions, the same scenario is expected to hold true for an income difference of \$20,200.

Ten more trees in every block is about 4% increase in street tree density in a dissemination area in Toronto, which seems to be logistically feasible; Toronto's dissemination areas have a 0.2% to 20.5% range of street tree density and trees can be incorporated into various planting areas along local roads. According to our findings improving health perception and decreasing cardio-metabolic conditions by planting 10 more trees per city block is equivalent to increasing the income of every household in that city block by more than \$10,000, which is more costly than planting the additional 10 trees. (See the "Urban Watershed Forestry Manual, Part 3 Urban Tree Planting Guide" for estimation of urban tree planting and maintenance costs and other considerations for urban tree planting. Generally, planting and maintenance of 10 urban trees could annually cost between \$300 to \$5000). Finally, it should be mentioned that this estimation of increased tree density being equivalent to specific increases in economic status of people is based on respondents from Canada, which has a publically funded universal health-care system. It may be the case that in other countries that do not have universal health care individuals' health may be more affected by economic status, which could cause the tree density relationship with health to be smaller-in economic terms. This, however, is an empirical question that is certainly worthy of further investigation.

The second important finding is that the "health" associations with tree density were not found (in a statistically reliable manner) for tree density in areas other than beside the streets and along local roads. It seems that trees that affect people most generally are those that they may have the most contact (visual or presence) with, which we are hypothesizing to be those planted along the streets. Another possible explanation could be that trees on the street may be more important to reductions in air pollution generated by traffic through dry deposition<sup>32</sup>. This *does not* indicate, however, that parks are not beneficial.



This study only shows that planting trees along the roads may be more beneficial than planting trees in parks and private residences at least for these health measures. For example, our sample only consists of adults and trees in parks may be more beneficial to children who spend more time in such locations<sup>33</sup>. Future studies need to address this possibility more thoroughly.

An important issue that is not addressed in this study is the mechanisms by which these beneficial effects of proximity to more (or larger) urban trees on health occur. Improving air quality, relieving stress, or promoting physical activity could all be contributing factors to improved reported health. The current study provides two pieces of information that could be useful when trying to study the underlying mechanisms of the health benefits attained from urban trees. First, more than proximity (tree density in the neighborhood), it is the availability of the trees to the largest proportion of people (trees on the roads) that is beneficial. Second, the form of the relationship is linear, at least in the density range of 0 to 20% for trees on the streets found in the city of Toronto (i.e., adding the quadratic or the square root of street tree density to the multiple regressions did not improve the models, suggesting that the relationship of health outcomes with street tree density neither decreases (quadratic transformation), nor increases (square root transformation) in a meaningful way at higher levels of street tree density). These two results imply that: 1) some of the effects may be partially related to the mere visual exposure to trees<sup>16,18,24</sup> or to the dry deposition of air pollutants and 2) that the effects are not likely to plateau or accelerate, in a meaningful way, as the level of tree canopy density increases.

In addition, in a post-hoc analysis, we compared the health outcomes of individuals living in areas with more leaf-retaining versus more deciduous trees, adjusted for street and other tree density and demographic variables. Our analysis showed that people living in year-round green areas (more leaf-retaining trees) reported less cardio-metabolic conditions ( $p = 0.017$ ) than their peers, but not better health perception. Again, while not conclusive, this result points to some importance regarding the types of trees that should be planted, but it would be much too premature to favor the planting of non-deciduous vs. deciduous trees.

Our study could benefit from improvements in at least three aspects. First, we used cross-sectional data for practical reasons; longitudinal data would provide us with much stronger inferences of causality. Second, our health data items are self-reported, which introduces some error and potential biases in health variables reported. Third, we are assuming that controlling for area median income accounts for many other neighborhood variables that could affect mental and physical health in indirect ways (such as neighborhood safety, pollution, etc.), which might not always hold true. In future research we plan to test our current findings in a more comprehensive manner that obviates the mentioned limitations. In summary, our results show that street trees are associated with a significant, independent and reliable increase in health benefits in urban populations and that small increases in the number of trees along the street could improve health markedly and in cost-effective ways.

## Materials and Methods

Canada is divided into geographical units called dissemination areas (DA), which consist of 400 to 700 inhabitants and whose boundary lines mostly follow roads. We used data from 3,202 DAs located in the city of Toronto with an average population of 690 individuals and average physical size of 172,290 m<sup>2</sup>.

We combined data from three different sources to construct our tree, health and demographic variables:

The first source of tree canopy data came from the 'Street Tree General Data,' which is a Geographical Information System (GIS) dataset that lists the locations of over 530,000 individual trees planted on public land within the city of Toronto. This dataset comes from experts who traversed the city of Toronto and recorded tree species and diameters at breast height. Trees in public parks are not listed as the listed trees were only from public land that lines the streets. The set contains each tree's common and botanical names, their diameters at breast height (DBH), the street addresses and the general location reference information. Figure 1 shows the green-space map of Toronto generated from these data for illustration.

The second source of tree canopy data came from the Geographical Information System (GIS) polygon data set 'Forest and Land Cover,' which contained detailed areal information of tree canopies in Toronto. In these data, the satellite imagery resolution was 0.6 m – from QuickBird Satellite imagery, 2007. The treed area was calculated using automated remote sensing software - Ecognition. This automated land-cover map was then monitored by staff from the University of Vermont Spatial Analysis Lab and adjusted to increase accuracy. In this dataset there is the ability to differentiate shrub cover from trees. There is, however, some susceptibility to errors when differentiating large shrubs from trees. To validate the accuracy of the QuickBird satellite imagery, it was compared with two other methods used to assess tree canopy cover: 1) Ocular estimates of canopy cover by field crews during data collection in 2008; 2) 10,000 random point samples of leaf-off and leaf-on aerial orthophotos (imagery available in required orthorectified format included 1999, 2005 and 2009)<sup>34</sup>. The tree canopy coverage estimates for each of the respective approaches were: QuickBird: 28%; Ocular: 24%; and Aerial Orthophotos: 26.2% respectively<sup>34</sup>. Because of the similarity in results, we can be confident in the accuracy of the QuickBird satellite results. For more information on the automated classification of leaf-on tree canopy from the 2007 satellite imagery see Appendix 4 of<sup>34</sup>. Figure 2 shows a map of tree canopy in each dissemination area as generated from the QuickBird Satellite.



Information about individuals' health and demographics was obtained in the context of the Ontario Health Study (<https://www.ontariohealthstudy.ca>). This is an ongoing research study of adults (18 years and older) living in the Canadian province of Ontario aimed at investigating risk factors associated with diseases such as: cancer, diabetes, heart disease, asthma, and Alzheimer's Disease. The data were collected using two (similar) versions of a web-based questionnaire consisting of demographic and health-related questions. These questionnaires were completed by 94,427 residents living in the greater Toronto area between September, 2010 and January, 2013. For this study, we used data from a subset of 31,109 residents (31,945 respondents, out of which 827 were removed during quality control for having duplicate records and 9 were removed because of missing consent records). A record was considered a duplicate with the following data quality checks: 1) Multiple registrations of the same Last Name, First Name and Date of Birth 2) Multiple registrations of the same Last Name, First Name and Postal Code 3) Multiple registrations of the same Last Name, First Name, Date of Birth and Postal Code 4) Multiple registrations of the same email address. Additional data quality checks included several built-in checks in the online system, which included automatic skip patterns and limited ranges for free text numerical responses such that participant responses must be within reasonable limits. The final sample included individuals who resided in the 3,202 dissemination areas of the city of Toronto as individual tree data were only available for these areas. These dissemination areas are shown in Fig. 3.

**Demographic Variables.** For each individual, we used sex (59% female; compared to the population male/female ratio: Toronto's population was 48.0% male and 52.0% female in 2011 according to Statistics Canada), age (Mean = 43.8, range = 18–99; as of 2011 the mean age of residents above 19 years of age for the entire population of Toronto is: 47.9 according to Statistics Canada), education (coded as: 1 = none (0.0%), 2 = elementary (1.0%), 3 = high school (15.3%), 4 = trade (3.3%), 5 = diploma (15.9%), 6 = certificate (5.9%), 7 = bachelor's (35.3%), 8 = graduate degree (23.3%), with Mean = 6.07, range = 1–8; According to the 2011 National Household Survey in [www.toronto.ca](http://www.toronto.ca), the distribution of education for the entire city of Toronto is the following: 33% of all City residents 15 years and over have a bachelor degree or higher, 69% of City residents between the ages of 25 and 64 years have a postsecondary degree, 17% of 25–64 years old residents have graduate degrees), and annual household income (coded as: 1 = less than \$10 000, 2 = \$10 000–\$24 999, 3 = \$25 000–\$49 999, 4 = \$50 000–\$74 999, 5 = \$75 000–\$99 999, 6 = \$100 000–\$149 999, 7 = \$150 000–\$199 999, 8 = \$200 000 or more, with Mean = 4.67 which is equivalent to \$90 806 annual income range = 1–8; compared to the entire city of Toronto's population mean household income, which was: \$87,038 in 2010 according to Statistics Canada), as well as diet (number of fruits and vegetable servings respondent consume every day, with Mean = 2.24, range = 0–10), as potential confounding variables. In addition, for each dissemination area we used the area median income from Statistics Canada and coded those data the same as the household income data, with mean = 4.08, range = 2–8. Population densities in a given DA were used in the multiple imputation analysis but not as a variable in the regressions or the canonical correlation analyses. The correlations between demographic variables can be found in Figure S2 of Supplementary Information.

Our studied sample had similar demographics to the entire city of Toronto, but was slightly younger (mean age = 43.8; Toronto population = 47.9), slightly more female (59%; Toronto population = 52%), slightly more educated (35.3% had bachelor's degrees vs. 33% in the Toronto population) and slightly wealthier (mean household income = \$93,399 vs. \$87,038 in the entire city of Toronto).

**Green-space variables.** *Crown area of the trees* was used to calculate the density of area covered by trees separately for the trees on the streets and the trees from greenspace in private locations and parks in each DA. We estimated the crown area of the trees based on their diameter at breast height (DBH) values. We obtained formulas for estimating tree crown diameter based on DBH for 8 tree types (Maple, Locust, Spruce, Ash, Linden, Oak, Cherry, and Birch) that were derived from forestry research. Forestry researchers have fit linear and non-linear models to relate crown diameter and DBH for different species of trees. These models achieved good fits as verified by their high  $R^2$  values (above 0.9)<sup>35,36</sup>. The formulas that were used to estimate crown diameters from DBH for these tree types and their references can be found in the Supplementary Equations section of the Supplementary Information. These 8 tree species covered 396,121 (83%) of the trees in our dataset. For the other 81,017 (17%) of the trees, we estimated crown diameter based on the linear regression of crown diameters on DBHs obtained from the 83% of the trees belonging to the tree types with known crown formulas. The crown areas of all the trees were then calculated using the crown diameters and assuming that the crown areas were circular in shape.

*Street tree density* for each dissemination area was quantified as the total area of the crowns of trees ( $m^2$ ) beside the streets in the dissemination area over total dissemination area size ( $m^2$ ) multiplied by 100 to be in percentage format. The range for this variable was found to be from 0.02% in the areas with the least street tree density to 20.5% in the areas with highest street tree density (Mean = 4.57%). *Other tree density* for each dissemination area was calculated by subtracting out the area covered by crowns of the trees on the streets (street tree area) from the total treed area ( $m^2$ ) in the dissemination area (from the satellite Tree Canopy data), and then dividing that by the area size and multiplying by 100 to be in percentage format. The range for this variable was found to be from 0.00% in the areas with almost no trees in parks (or no parks), no domestic gardens or other open areas; to 75.4% in areas with high tree

density and parks (Mean = 23.5%). As mentioned above, there was limited ability to differentiate large shrub cover from tree cover in the satellite data. Therefore, the variable “other tree density” could contain some unwanted large shrub cover as well, especially for areas with very high other tree density.

**Health variables.** All of the health variables were constructed from the self-reported items in the Ontario Health Study (OHS). Items related to disorders were based on the question “Have you ever been diagnosed with ...?” and coded with 0 = No and 1 = Yes. These consisted of physical conditions including high blood pressure, high cholesterol, high blood glucose, heart attack (MI), stroke, heart disease, migraines, chronic obstructive pulmonary disorder (COPD), liver cirrhosis, ulcerative colitis, irritable bowel disease (IBD), arthritis, asthma, cancer, and diabetes (DM), as well as mental health conditions including addiction, depression, and anxiety. About 66.3% of all respondents reported having at least one of the mentioned health conditions. The percentages of “Yes” responses for each of these conditions are reported in Supplementary Table S3. Additionally, body mass index (BMI) for each person was calculated from his/her self-reported height and weight. Our “Obesity” variable was constructed as 0 for BMI below 25, 0.5 for BMI between 25 and 30 (overweight, 26% of respondents), and 1 for BMI over 30 (obese, 13% of respondents). Other variables drawn from these data are general health perception (self-rated health (1 = poor, 2 = fair, 3 = good, 4 = very good, 5 = excellent, with Mean = 3.66, range = 1–5), and four more variables that were used in the multiple imputations to increase the accuracy of imputations: walking (the number of days a participant has gone for a walk of at least 10 minutes in length last week, with Mean = 5.33, range = 0–7), smoking (if participant has ever smoked 4–5 packs of cigarettes in their lifetime, 38% Yes), alcohol consumption frequency (coded as 0 = never, 1 = less than monthly, 2 = about once a month, 3 = two to three times a month, 4 = once a week, 5 = two to three times a week, 6 = four to five times a week, with Mean = 3.60, range = 0–7), and alcohol binge frequency (coded as 0 = never, 1 = 1 to 5 times a year, 2 = 6 to 11 times a year, 3 = about once a month, 4 = 2 to 3 times a month, 5 = once a week, 6 = 2 to 3 times a week, 7 = 4 to 5 times a week, 8 = 6 to 7 times a week, with Mean = 1.62, range = 0–8).

The dependent variables related to physical and mental health were created from the multiple-imputed data. For each complete dataset, the *Cardio-metabolic Conditions* index was constructed by summing the following seven variables related to cardio-metabolic health: High Blood Glucose, Diabetes, Hypertension, High Cholesterol, Myocardial infarction (heart attack), Heart disease, Stroke, and “Obesity” with Mean = 0.89, range = 0–8. The *Mental disorders* index was constructed by summing Major Depression, Anxiety, and Addiction, with Mean = 0.26, range = 0–3. The *Health Perception* index was the third dependent variable in our analyses with Mean = 3.66, range = 1–5. The *Other disorders* index consisted of Cancer, Migraines, Asthma, and Arthritis (Mean = 0.48, range = 0–4). This index was constructed to be a control variable in the canonical correlation analysis. The additional variables (e.g., cirrhosis) were included to increase the accuracy of the imputation, but were not analyzed. The correlation matrix between the health variables, the tree variables, and the demographic variables is reported in supplementary Figure S2 of the Supplementary Information.

**Multiple imputations analysis.** The self-reported health data contained some missing values for different variables (mainly due to “I don’t know” responses). List wise deletion of the data (keeping only participants with no missing values in any of the items) would have resulted in a loss of 73% of the participants because the missing values in the different items were distributed across subjects, and was therefore an unreasonable method of analysis. To handle the missing data problem, we assumed that the data were missing at random (MAR), meaning that the probability of missingness for a variable was not dependent on the variable’s value after controlling for other observed variables. We then replaced the missing values with multiple imputed data<sup>37–39</sup>. Thirty complete datasets were created from the original dataset using the estimate and maximize (EM) algorithm on bootstrapped data implemented by the Amelia package for R [Amelia<sup>40</sup>]. All of the 30 imputations converged in less than 11 iterations. Variables used in the imputations and their missing percentages are reported in Supplementary Table S4.

**Regression analysis.** The regression analyses were performed separately for each imputed dataset and then combined based on Rubin’s rules<sup>38</sup> using the *Zelig* program in R<sup>41</sup>. Rubin suggested that the mean of each regression coefficient across all imputed datasets be used as the regression coefficients for the analysis. In addition, to avoid underestimation of standard errors and taking the uncertainty of the imputed values into account, both the within imputation variance and between imputation variance of each coefficient should be used to construct the standard error for each regression coefficient. Lastly<sup>42</sup>, proposed using degrees of freedom estimated as a function of the within and between imputation variance and the number of multiple imputations when approximating the t-statistics for each parameter.

To assess the amount of the variance in the dependent variables that is explained by the regression model for the multiple imputed data we used the method suggested by Harel (2009) to estimate the  $R^2$  and the adjusted  $R^2$  values. Based on this method, instead of averaging  $R^2$  values from the 30 imputations, first the square root of the  $R^2$  value ( $r$ ) in each of the imputed datasets is transformed to a z-score using Fisher’s  $r$  to  $z$  transformation,  $z = \text{atanh}(r)$ . The average  $z$  across the imputations can then be calculated. Finally, the mean of the  $z$  values is transformed back into an  $R^2$ . The same procedure can be used for adjusted  $R^2$  values. Harel (2009) suggests that the number of imputations and the sample size

be large when using this method, which holds true in the current study. Also, the resulting estimates of  $R^2$  could be inflated (i.e. are too large), while estimates of adjusted  $R^2$  tend to be biased downwards (i.e. are too small). Therefore, we estimated both values for a better evaluation of the explained variance.

**Canonical correlation analysis.** To investigate further the relationship between the two sets of variables, namely the health-related variables (Health Perception, Cardio-metabolic conditions, Mental Disorders, and Other Disorders) and the demographic and green-space variables (Age, Sex, Education, Income, Area income, Diet, Street Tree Density, and Other Tree Density), we performed a canonical correlation analysis<sup>43,44</sup>. Our model is presented in the diagram shown in Fig. 4. Mauchly's test of sphericity was performed on the average of imputations in MATLAB (Sphertest: Sphericity tests menu) and showed that the correlation matrix of the data is significantly different from the identity matrix ( $p < 0.0001$ ). This significant departure of the data from sphericity warrants the canonical correlation analysis.

In a canonical correlation analysis, first, the weights that maximize the correlation of the two weighted sums (linear composites) of each set of variables (called canonical roots) are calculated. Then the first root is extracted and the weights that produce the second largest correlation between sum scores is calculated, subject to the constraint that the next set of sum scores is orthogonal to the previous one. Each successive root will explain a *unique* additional proportion of variability in the two sets of variables. There can be as many canonical roots as the minimum number of variables in the two sets, which is four in this analysis. Therefore, we obtain four sets of canonical weights for each set of variables, and each of these four canonical roots have a canonical correlation coefficient which is the square root of the explained variability between the two weighted sums (canonical roots).

To obtain unbiased canonical weights for variables and canonical correlation coefficients, we averaged data values over the 30 imputations and performed canonical correlation analysis on the z-scores of the averaged data using MATLAB (MATLAB and Statistics Toolbox Release 2014a, The MathWorks, Inc., Natick, Massachusetts, United States). For a more straight-forward interpretation and better characterization of the underlying latent variable, instead of using the canonical weights, we calculated the Pearson correlation coefficient (canonical loading) of each observed variable in the set with the weighted sum scores for each of the four linear composites. This way, each canonical root (linear composite) could be interpreted as an underlying latent variable whose degree of relationship with each of the observed variables in the set (how much the observed variable contributes to the canonical variate) is represented by the loading of the observed variable and its errorbar (see canonical correlation results).

To estimate the standard errors of the canonical loadings, we bootstrapped z-scores from each of the 30 complete imputed data (1000 simulations for each) and performed canonical correlation analysis 30000 times using MATLAB. Then, we calculated the variances of the set of loadings, which were calculated as explained above, over each completed dataset (within imputation variance). We also calculated the variance of the 30 sets of coefficients (between imputation variance). The standard errors of the coefficients were then estimated using the same Rubin's rules as was done for the regression analyses.

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## Acknowledgements

This work was funded in part by a TKF Foundation grant to MGB, an internal grant from the University of Chicago to MGB and the Tanenbaum Endowed Chair in Population Neuroscience at the University of Toronto to T.P. Data used for this research were made available by the Ontario Health Study (OHS), which is funded by the Ontario Institute for Cancer Research, the Canadian Partnership Against Cancer, Cancer Care Ontario, and Public Health Ontario. We thank the participants in the Ontario Health Study. We also thank Kelly McDonald and Tharsiya Nagulesapillai for preparing the data from OHS, and Ruthanne Henry for helping us gain access to the Toronto GIS data.

## Author Contributions

L.J.P. and T.P. were involved in the collection of the health data. M.G.B., P.G. and F.M. aggregated the greenspace data. M.G.B., O.K., P.G., T.P. and B.M. analyzed the data. P.G. prepared Figures 1–3 and O.K. prepared Figures 4–7. All authors wrote and reviewed the manuscript.

## Additional Information

**Supplementary information** accompanies this paper at <http://www.nature.com/srep>

**Competing financial interests:** The authors declare no competing financial interests.

**How to cite this article:** Kardan, O. *et al.* Neighborhood greenspace and health in a large urban center. *Sci. Rep.* 5, 11610; doi: 10.1038/srep11610 (2015).





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# The Health Impacts of Gambling Expansion in Toronto

Technical Report  
November 2012

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**Reference:**

Toronto Public Health. *The Health Impacts of Gambling Expansion in Toronto – Technical Report*. November 2012.

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**Acknowledgements:** The assistance of the following people who contributed to the preparation of this report is gratefully acknowledged: Anna Pancham, Monica Campbell, Dr. David McKeown, Karen Wade, Phil Jackson, Jan Fordham, Charles Yim, Jayne Caldwell, Angela Loconte, Julie Amoroso, Mary Jo Verissimo and Dean Simikic (Toronto Public Health)

**Reviewers:**

Sincere thanks are also extended to our external expert peer reviewer, Dr. Robert Williams (Faculty of Health Sciences, University of Lethbridge), who provided helpful feedback on an earlier draft of this report.

**Copies:**

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## About this Report:

This report was prepared in response to *Modernizing Lottery and Gaming in Ontario: Strategic Business Review* a report from the Ontario Lottery and Gaming Corporation (OLG), approved by the Ontario Ministry of Finance in March 2012. There are many recommendations in the OLG report that will result in increased access to gambling in Ontario. The focus of this report is on the OLG recommendation to open a casino in Toronto.

Toronto Public Health (TPH) staff collaborated with experts at the Centre for Addiction and Mental Health's Problem Gambling Institute of Ontario to review the health impacts of gambling, the prevalence of problem gambling in the Greater Toronto Area and recommended strategies to prevent and mitigate harms from increasing access to gambling.

In addition to this technical report, there is a TPH staff report that summarises this technical report, presents stakeholder consultations and provides recommendations to minimise casino-related gambling addiction. Alongside these two reports, the *Toronto Public Health Position Statement on Gambling and Health* outlines policy recommendations in the context of overall gambling expansion in Ontario. The staff report, this technical report and the TPH Position Statement were presented to the Toronto Board of Health on November 19, 2012.

Copies of both reports and the TPH Position Statement can be found at:

<http://www.toronto.ca/health/>



Toronto Public Health reduces health inequalities and improves the health of the whole population. Its services are funded by the City of Toronto, the Province of Ontario and are governed by the Toronto Board of Health. Toronto Public Health strives to make its services accessible and equitable for all residents of Toronto.



The Centre for Addiction and Mental Health (CAMH) is Canada's largest mental health and addiction teaching hospital, as well as one of the world's leading research centres in the area of addiction and mental health. CAMH combines clinical care, research, education, policy development, and health promotion to transform the lives of people affected by mental health and addiction issues. CAMH's Problem Gambling Institute of Ontario (PGIO) brings treatment professionals and leading researchers together with experts in communicating and sharing knowledge. Its focus is on collaboratively developing, modelling and sharing evidence-based solutions to gambling-related problems within Ontario and around the world.



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# Executive Summary

This report outlines the key issues and current research on the public health impacts of gambling. Hosting a new casino in Toronto is anticipated to increase the frequency and severity of problem gambling in the city, which can produce negative health impacts on individuals, families and communities.

Gambling expansion has been identified as an issue by the public health community in Canada and internationally since the 1990s. Problem gambling is a serious public health concern because of the associated health impacts and related social impacts. Researchers who define problem gambling as including both moderate risk and the most severe form of problem gambling estimate that the prevalence of problem gambling in Ontario is between 1.2% and 3.4%. The most severe form of problem gambling affects upwards of 11,000 people aged 18+ (0.2%) in the Greater Toronto Area (GTA) and 25,000 (0.3%) in Ontario. In addition, approximately 129,000 people aged 18+ (2.8%) in the GTA and 294,000 people (3.0%) in Ontario are considered to be at risk for problem gambling. Problem gambling has a profound impact on gamblers' friends and families, thus substantially increasing the population affected by problem gambling. Evidence shows that some socio-demographic groups are over-represented as problem gamblers and are more vulnerable to negative impacts of gambling. This may include males, youth, older adults, Aboriginal peoples, and individuals and families with low income.

There can be substantial consequences of gambling behaviour on health. Problem gambling is associated with a range of negative impacts on physical and mental health, including ill health, fatigue, co-related substance use and addiction, depression and suicide among others. These impacts occur alongside others such as financial difficulties, family breakdown, divorce and compromised child development. The impacts extend beyond the gamblers themselves, and affect the health and well-being of family, friends, colleagues and communities.

Available evidence indicates that the prevalence of problem gambling increases with access to gambling, including proximity to casinos. A casino located anywhere in the GTA will likely result in increased health risks from problem gambling, with a greater effect on closer communities compared to those further away. All potential sites in the GTA have vulnerable populations nearby. Furthermore, specific features of casino operation are associated with increased risk of harm including: extended hours of operation (24 hours a day, 7 days a week) and the presence of electronic gaming machines (EGMs) such as slot machines.

While there are many interventions available for problem gambling, much remains unknown about how to treat problem gambling. Only a minority of problem gamblers (1-2% per year) seeks or receives treatment. Furthermore, there is limited evidence on the effectiveness of interventions to prevent problem gambling. There is currently a need for better evidence on how to effectively mitigate the negative health and social impacts of problem gambling.

The key findings of this report suggest that problem gambling increases with access to a casino, therefore any expansion in gambling access in the GTA over and above current levels will likely increase problem gambling rates and the associated health risks for Toronto and nearby communities. Consideration of the potential negative health impacts of establishing a new casino in Toronto must inform decision-making. A public health approach calls for a broad range of strategies and policies that prevent or mitigate gambling-related harm, promote healthy choices, and protect vulnerable or high-risk populations. In the context of gambling expansion, a comprehensive program of harm mitigation measures should be put in place to minimize the risks associated with problem gambling and reduce the associated negative health impacts to problem gamblers and their families. Finally, there is a need for ongoing and rigorous monitoring and evaluation of the health, social and economic impacts of casinos.

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# 1. Introduction

## 1.1 Overview

In its 2012 Ontario Budget, the Province directed the Ontario Lottery and Gaming (OLG) Corporation to modernize lottery and gaming operations based on OLG's *Strategic Business Review*.<sup>1</sup> There are currently 27 legal gambling sites in Ontario, consisting of slots, casinos and resort casinos. OLG intends to increase this to 29 sites, including adding a casino in the Greater Toronto Area (GTA). This expansion would meaningfully increase access to gambling opportunities for Toronto residents. Currently, the closest casinos are in Port Perry (80 km away from Toronto), Brantford (100 km), Niagara (130 km) and Orillia (135 km). There is also a seasonal charity casino on the Canadian National Exhibition grounds and there are slot machines, virtual table games and horse racing at Woodbine Racetrack, as well as slots at Ajax Downs (50 km) and Flamboro Downs in Hamilton (80 km).

Based on provincial regulation, OLG will proceed in developing a new casino only with support from municipalities. In light of the possibility of developing a new site in Toronto, Toronto City Council will consider the pros and cons of hosting a new commercial casino or integrated resort entertainment complex that includes gaming. Given concerns raised regarding the potential for impacts on the health of Toronto residents from the introduction of a casino in Toronto, Toronto Public Health (TPH) and the Centre for Addiction and Mental Health's Problem Gambling Institute of Ontario undertook a review of the issue.

## 1.2 Purpose and Scope

The purpose of this report is to outline current research that analyzes the public health impacts of gambling. This report focuses on the health and related social impacts of problem gambling at individual, family and community levels, since this is an important and direct consequence of gambling. Increased access to gambling may have other impacts on population health other than problem gambling. The health impact of changes in employment, crime, traffic or economic development may be positive or negative. A comprehensive analysis would be extremely complex and is beyond the scope of this report. The goal is to report evidence on the potential health effects of increased access to gambling on problem gambling that will enable informed policy decisions on the question of hosting a casino in Toronto.

First, the report provides information on the prevalence of gambling in Toronto, the GTA and Ontario, and describes gambling involvement and the sociodemographic characteristics associated with types of gamblers in Ontario. Second, the report reviews the literature on factors contributing to problem gambling, including the impacts of availability, access and proximity to a casino and the impacts of specific gambling modalities. Wherever possible, the report focuses specifically on casinos. Literature dealing with gambling in general has been utilized where information on casinos is not available.

Next the literature review outlines evidence on the health impacts of problem gambling, including physical and mental health impacts, substance use, addiction, suicide, and the associated impacts such as financial difficulties, divorce, family breakdown and compromised child development. Finally, the report describes intervention options and evidence of effectiveness, and includes a discussion of interventions currently available in Toronto and Ontario.



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## 1.3 Background and Public Health Approach

When deliberating the merits of an increase in access to gambling, including new casinos, it is important to assess the potential impact to public health. The public health community in Canada and internationally has identified gambling expansion as an issue since the 1990s, around the time of rapid introduction and expansion of legal gambling opportunities.<sup>2</sup>

The public health perspective on gambling applies an approach for understanding the expansion of gambling which considers social and environmental determinants as well as individual risk factors in producing gambling-related problems. One of the main negative impacts of gambling introduction is an increase in the number of problem gamblers.<sup>3</sup> As a result, a key focus of this review is on problem gambling, a significant public health concern.

This report uses definitions from a Canadian Public Health Association (CPHA) position paper on gambling expansion in Canada.<sup>4</sup> CPHA defines gambling as “risking money or something of value on the outcome of an event involving chance when the probability of winning or losing is less than certain”. Problem gambling is defined as gambling behaviour which includes “continuous or periodic loss of control over gambling; preoccupation with gambling and money with which to gamble; irrational thinking; and continuation of the activity despite adverse consequences”. Pathological gambling is a clinically significant form of disordered behaviour that “focuses on impaired ability to control gambling-related behaviour; adverse social consequences that are disruptive to one's life and withdrawal”.

The research literature uses gambling terminology in diverse and inconsistent ways. The term “gaming” is often used for instances where gambling activity has been legalized by applicable laws. As this report is only addressing legal casino gambling, it uses gambling and gaming interchangeably. In addition to problem and pathological gambling, a variety of other terms are used in the literature, including “disordered”, “problematic”, “compulsive”, “addictive” and “excessive” gambling. The lack of standard terminology can result in ambiguity and confusion, and creates difficulties for scientific study and public discourse.<sup>4</sup>

This report uses the term problem gambling to describe a continuum of gambling behaviour that creates negative consequences for the gambler, others in his or her social network, or in the community.<sup>5,6</sup> It conceptualises problem gambling as dynamic, rather than as a clinical condition. This is in line with a public health perspective, which views behaviours along a health-related continuum (i.e. health enhancing or illness producing, rather than as the sick/well dichotomy)<sup>7</sup> and seeks to protect and promote the health of the whole population.<sup>8</sup> The practical implication of this approach is that it acknowledges the impacts of problem gambling as being wider than on those who are clinically diagnosed.

## 1.4 Methods and Sources

An important source of information for this technical report was the Centre for Addiction and Mental Health's (CAMH) Gambling Policy Framework.<sup>8</sup> This framework presents seven principles for a public health approach to gambling in Ontario and gives recommendations for action around each principle. Box 1 presents a detailed description of the CAMH Gambling Policy Framework.

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**Box 1: CAMH Gambling Policy Framework (2011)****Principles for an Ontario approach to gambling**

Based on the evidence reviewed above and the belief that gambling should be regulated and operated with public health as its prime imperative, CAMH offers the following principles for an Ontario approach to gambling:

1. Ontarians are not exposed to high-risk gambling environments and modalities.
2. Ontarians have the right to abstain from gambling, and to establish limits on the extent of their participation.
3. Those who choose to gamble are informed of the odds of winning, and of the potential consequences and risks.
4. Ontarians whose lives are most affected by problem gambling have access to high-quality, culturally appropriate care.
5. Gambling legislation and regulation must establish a minimum duty of care.
6. Government regulation and operation of gambling should have as its primary focus the protection of populations at greatest risk of developing gambling problems.
7. Government decisions on gambling are based on best evidence, and research on gambling is supported.

Centre for Addiction and Mental Health (2011)

Toronto Public Health conducted an analysis of Canadian Community Health Survey (CCHS) data. CCHS is a joint initiative of Statistics Canada and Health Canada. It is a cross-sectional survey that collects information related to health status, health care utilization and health determinants for the Canadian population. CCHS began in 2000 with data collection every two years. In 2007, the frequency of data collection changed to every year. CCHS relies on a large, random sample of respondents and is aimed at providing health information at the regional and provincial levels.<sup>9</sup>

The CCHS is the main source of population-level data on gambling in Canada. Statistics Canada offers an optional gambling module in the CCHS that must be selected by provinces or territories. The gambling module assesses gambling behaviour according to how people respond to questions about types of activity, amount of spending and length of time/frequency of gambling. The classification of gambling behaviour is based on the Canadian Problem Gambling Index (CPGI). Box 2 provides a detailed description of the CPGI and gambling behaviour classification. Ontario selected the gambling module in 2002 and 2007/08. The most recent data, 2007/08, are described in this report. Due to small sample sizes for that cycle of the CCHS, prevalence by gambling type is reported for Ontario and the Greater Toronto Area (GTA); the detailed analysis of problem gambling is based on respondents in Ontario; and data for low-risk and moderate-risk gamblers have been combined. Respondents under 18 years of age were excluded from the analysis. The 2007/08 CCHS cycle included 38,233 respondents in Ontario and 10,070 respondents in the GTA.

## Box 2: Canadian Problem Gambling Index (CPGI)

The **Canadian Problem Gambling Index (CPGI)** was developed in the late 1990s by a team of researchers under the Canadian Centre on Substance Abuse for the Inter-Provincial Task Force on Problem Gambling, and was designed to measure problem gambling at the population-level using a holistic approach. The CPGI operationalizes problem gambling as: "gambling behaviour that creates negative consequences for the gambler, others in his or her social network, or for the community." (Ferris & Wynne, 2001) The CPGI includes three sections: gambling involvement, problem gambling assessment and correlates of problem gambling.

The **gambling involvement** section measures the frequency of gambling participation for 13 gambling activities, including: instant win/daily lottery tickets; electronic gambling machines (EGMs) in casinos; lottery tickets, raffles, fundraising tickets; cards/board games; sports lotteries; other games (aside from EGMs) in casinos; bingo; internet/arcade; games of skills; speculative investments; EGMs outside of casinos; live horse racing and other gambling activities. This section also addresses spending on gambling in the past 12 months and duration of involvement. In the CCHS, the participation and spending questions determine whether respondents are asked the Problem Gambling Severity Index (PGSI) and contribute to the gambling classifications.

The **problem gambling assessment** includes 12 items, nine of which comprise the PGSI. These nine measures address gambling behaviour and consequences of gambling. They are asked in reference to the past 12 months, and include:

1. How often have you needed to gamble with larger amounts of money to get the same feeling of excitement?
2. When you gambled, how often did you go back another day to try to win back the money you lost?
3. How often have you borrowed money or sold anything to get money to gamble?
4. How often have you felt that you might have a problem with gambling?
5. How often has gambling caused you any health problems, including stress or anxiety?
6. How often have people criticized your betting or told you that you had a gambling problem, regardless of whether or not you thought it was true?
7. How often has your gambling caused financial problems for you or your family?
8. How often have you felt guilty about the way you gamble or what happens when you gamble?
9. How often have you bet more than you could really afford to lose?

Responses are scored (0-3 per item, maximum score of 27), and used to classify respondents into one of five categories: Non-gamblers, Non-problem gamblers, Low-risk gamblers, Moderate-risk gamblers and Problem gamblers. Prevalence rates are produced using these classifications. See descriptions below for more detail on the gambling classifications.

The **correlates of gambling** section include questions on family history of gambling problems and using drugs or alcohol while gambling. They were designed to contribute to the development of gambling profiles.

### Problem Gambling Severity Index (PGSI) – Gambling Classifications

**Problem gamblers:** Respondents classified as problem gamblers gamble more than five times a year and scored between 8 and 27 on the PGSI, indicating that gambling behaviours have resulted in adverse consequences on the individual, their social network or community.

**Moderate-risk gamblers:** Respondents in this group gamble more than five times a year, would have reported "never" to most of the behavioural questions and one or more "most of the time" or "always" responses and scored between 3 and 7 on the PGSI. Moderate-risk gamblers may or may not have experienced adverse consequences from gambling.

**Low-risk gamblers:** Respondents in this group gamble more than five times a year, would have reported "never" to most of the behavioural questions and one or more "sometimes" or "most of the time" responses and scored between 1 and 2 on the PGSI. Low-risk gamblers have not likely experienced adverse consequences from gambling.

**Non-problem gamblers:** Respondents classified as non-problem gamblers gamble less than five times a year, would have reported "never" to all behavioural questions and scored a zero on the PGSI. A score of zero indicates they have not experienced adverse consequences as a result of gambling. Ferris and Wynne (2001) noted that frequent gamblers who heavily invest time and money in gambling may be included in this classification, as would "professional gamblers".

**Infrequent gamblers:** Respondents in this group may have reported participating in gambling activities in the past 12 months, but self-reported "I am not a gambler". These respondents were not asked the PGSI questions.

**Non-gamblers:** Respondents classified as non-gamblers did not report participating in any of the listed gambling activities in the past 12 months. Non-gamblers were not asked the PGSI questions.

Note: The Canadian Consortium for Gambling Research has suggested a new scoring system for low and moderate-risk gamblers. Scores between 1 and 4 indicate low-risk gambling and scores between 5 and 7 indicate moderate-risk gambling. (Canadian Consortium for Gambling Research, <http://www.ccgr.ca/cpgi.php>)

For the literature review, this report draws upon a recent review of studies that examined the social and economic impacts of gambling by Williams, Rehm and Stevens (2011). The Williams *et al.* (2011) search strategy identified all studies reporting on the social or economic impacts of gambling from both the academic and non-academic or 'grey' literature.<sup>3</sup> They identified 492 studies, which were categorized by type of study, study quality, gambling format, location, years examined, and areas impacted. The majority of the empirical studies came from the United States, Canada, Australia and New Zealand. The review presented information on 16 different areas related to various economic and social impacts, with the areas relevant to this report consisting of problem gambling and related indices, socioeconomic inequality, and quality of life/public health.

In this report, Toronto Public Health extends the Williams *et al.* (2011) search strategy to identify studies since their review was published. We conducted a search of health and social impacts of casino gambling from both the academic and non-academic 'grey' literature since 2010.

For the review on intervention literature, this report draws upon a review of the issues and evidence by Williams, West and Simpson (2008).<sup>10</sup> The Williams *et al.* (2008) review summarizes the evidence on the effectiveness of problem gambling prevention initiatives. For this report, Toronto Public Health conducted a search strategy to identify intervention options and effectiveness from 2009 to present. This search included academic and grey literature that addressed prevention, early identification and treatment of problem gambling (More detail on the search strategies is found in Appendix A.).



## 2. Prevalence of Gambling & Problem Gambling

### 2.1 Prevalence

Gambling activities, as defined by the CPGI, are commonly reported by the Ontario population. In 2007/08, CCHS data shows that the prevalence of gambling, which included participation in at least one gambling activity in the past 12 months, was 66% in Ontario and 62% in the GTA.

The PGSI estimates that problem gambling seriously affects upwards of 11,000 people aged 18+ (0.2%<sup>B</sup>) in the GTA and 25,000 people aged 18+ (0.3%) in Ontario. In addition, there are approximately 129,000 people aged 18+ (2.8%) in the GTA and 294,000 people aged 18+ (3.0%) in Ontario who are considered low to moderate-risk gamblers, based on their gambling behaviour and likelihood of experiencing adverse consequences from gambling. The prevalence of problem gamblers and low to moderate-risk gamblers remained relatively similar between Ontario and the GTA (Table 1).

**Table 1: Type of Gambler, Aged 18+, Ontario and Greater Toronto Area, 2007/08**

Type of Gambler <sup>1</sup>	Ontario		Greater Toronto Area (GTA)	
	Percent	95% CI <sup>2</sup>	Percent	95% CI <sup>2</sup>
Problem Gamblers	0.3	(0.2, 0.3)	0.2 <sup>E</sup>	(0.1, 0.4)
Low to Moderate-Risk Gamblers	3.0	(2.7, 3.3)	2.8	(2.3, 3.2)
Non-Problem Gamblers	42.1	(41.3, 43.0)	35.7 (L)	(34.3, 37.2)
Infrequent Gamblers	20.4	(19.7, 21.1)	23.1 (H)	(21.8, 24.5)
Non-Gamblers	28.8	(28.0, 29.6)	32.1 (H)	(30.6, 33.6)
Not Stated	5.5	(5.1, 5.9)	6.1	(5.4, 6.9)

Notes: (1) Gambling classifications are based on a modified version of the nine-item Problem Gambling Severity Index (PGSI), part of the Canadian Problem Gambling Index (CPGI). (2) 95% Confidence intervals are used on response estimates, which means that the estimate is within the range 19 times out of 20. (3) Respondents classified as "Infrequent Gamblers" may have gambled in the past 12 months, but classified themselves as Non-Gamblers.

E – Moderately high sampling variability; interpret with caution. H – Significantly higher than Ontario. L – Significantly lower than Ontario. Low-risk and Moderate-risk gamblers were combined due to small sample sizes.

Data Source: Canadian Community Health Survey, 2007/08. Statistics Canada, Share File, Knowledge Management and Reporting Branch, Ontario Ministry of Health and Long-Term Care.

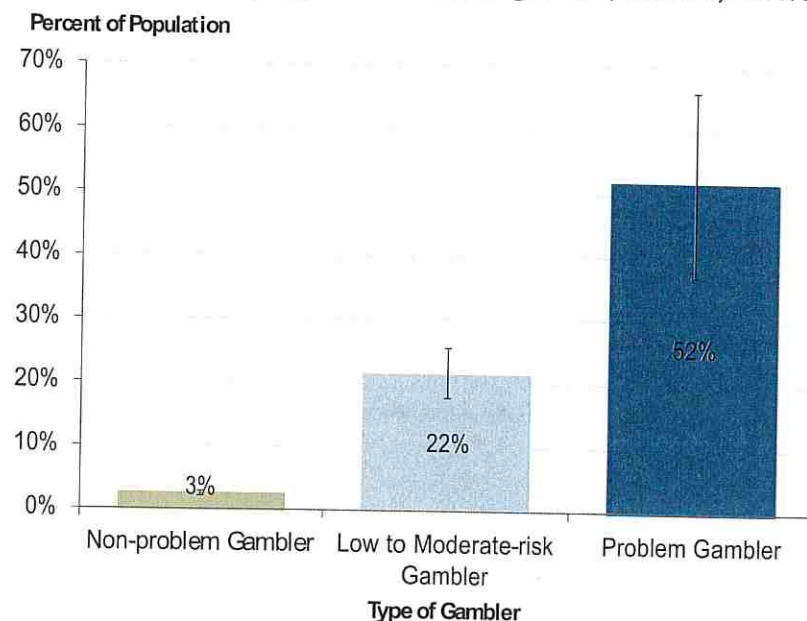
Prepared by: Toronto Public Health

Research based on gambling rates in Ontario from 2003 concluded that a small group of moderate risk and problem gamblers (4.8% of the population) generated a disproportionately large amount of gambling industry profits (36% of gambling revenue).<sup>11</sup> This is problematic because it suggests a large part of gambling revenue in Ontario is coming from a small group of vulnerable people.

### Gambling Involvement

In 2007/08, according to CCHS data for Ontario, problem gamblers were approximately four times more likely than non-problem gamblers to participate in multiple gambling activities over the past 12 months. This involves participation in 5 or more gambling activities. Compared to non-problem gamblers, problem gamblers were significantly more likely to gamble using electronic gambling machines (EGMs) in casinos (Figure 1).

**Figure 1: Monthly Participation in Gambling Using Electronic Gambling Machines (EGMs) in Casinos by Type of Gambler, Aged 18+, Ontario, 2007/08**



Notes: (1) Gambling classifications are based on a modified version of the nine-item Problem Gambling Severity Index (PGSI), part of the Canadian Problem Gambling Index (CPGI). (2) Error bars (I) denote 95% confidence intervals. Low-risk and Moderate-risk gamblers were combined due to small sample sizes.

Data Source: Canadian Community Health Survey, 2007/08. Statistics Canada, Share File, Knowledge Management and Reporting Branch, Ontario Ministry of Health and Long-Term Care.

Prepared by: Toronto Public Health

## Transition Between Gambling Risk Levels

While research is limited on the shift between different problem gambling risk levels, there is evidence to support the validity of “at-risk” gambling classifications in predicting future harm. As shown in Box 2, gambling classifications are based on gambling behaviour and likelihood of experiencing adverse consequences from gambling. A recent longitudinal study of gambling habits in Alberta identified gambler characteristics associated with the shift from low-risk to high-risk gambling.<sup>12</sup> Compared to gamblers who remained low risk, gamblers who shifted from low- to high-risk gambling were more likely to be male, older, have less education, smoke tobacco, have more friends who gamble, and play EGMs and other casino games. Some of these risk factors are fairly fixed or difficult to change, such as demographic variables and personality traits, whereas others are modifiable risk factors, such as gambling accessibility, intensity and frequency. This has implications for who may be likely to experience current or future gambling-related harm.

## Emerging Issues

During the early to mid-1990s, Internet gambling (also called online gambling) had emerged as a new and popular mode of gambling.<sup>13, 14</sup> The Internet made gambling accessible to any person with an Internet connection and means of electronically transferring money. Even so, the prevalence of Internet gambling is low and it is the least common form of gambling among adult Canadian gamblers.<sup>13</sup> Because of its low prevalence, it is difficult to estimate the proportion of Internet gamblers using conventional methods such as random digit dial telephone surveys.<sup>14</sup> According to a national study, 3% of adult

gamblers reported participating in Internet gambling (excluding stocks) over the previous year, compared to 8% participation in casino table games, and 34% in electronic gaming machines.<sup>13</sup>

There is limited evidence available on the health impacts of Internet gambling, and given the relatively short history of its availability, this includes a lack of longitudinal studies. More research is needed to better understand Internet gambling and the impact of this mode of gambling. Recent research from Quebec, one of two Canadian provinces where the government operates online gambling sites, indicates that problem gambling rates are significantly higher among those who gamble online.<sup>15</sup> Similarly, a Canadian study indicates problem gambling prevalence of 17.1% among Internet gamblers compared to 4.1% among gamblers who frequent fixed gambling venues.<sup>13</sup> This study also indicates higher average spending among Internet gamblers.

Available research suggests also there may be some distinguishing features associated with those who partake in Internet gambling, including demographic characteristics, motivations and behaviours. Compared to non-Internet gamblers, Internet gamblers are more likely to be male, work full-time, be married or co-habiting, and have high incomes and high levels of educational attainment.<sup>16</sup> Further, Internet gamblers may have more positive attitudes towards gambling and are more highly involved gamblers, engaging in many different gambling activities in both online and offline forms.<sup>13</sup>

While Internet gambling appears to normalize gambling behaviour, questions around whether Internet gambling is creating a new market of gambling customers remain unanswered. The evidence that Internet gamblers have a different profile than non-Internet gamblers suggests that they may represent a different customer base.<sup>13, 16</sup> While there is certainly overlap between Internet and non-Internet gamblers, researchers hypothesize that Internet gambling, to some extent, opens up a new market of gamblers who may not frequent fixed gambling venues such as casinos.<sup>16</sup> Wood and Williams suggest also that Internet gambling is an addition to the repertoire of activities among those who seem to already be heavily involved in gambling.<sup>13</sup> The OLG plans to launch online gaming sites regulated by the Ontario government as part of its modernization strategy for gambling offerings in this province.

## 2.2 Sociodemographic Profile

There has been considerable research examining the characteristics of people affected by or at-risk for problem gambling.<sup>17, 18, 19, 20</sup> There is a range of individual- and population-level factors that are reported to be associated with problem gambling. At the individual-level, these include: experiencing an early big win; having mistaken beliefs about the odds of winning; experiencing financial problems; and having a history of mental health problems.<sup>21</sup> At the population level, specific population groups have been identified because of factors such as low socioeconomic status, health status or unique needs.<sup>6</sup> Evidence suggests that a number of groups may be more heavily represented as problem gamblers or disproportionately affected by problem gambling.<sup>3, 22</sup> This includes youth, older adults, Aboriginal peoples, and individuals and families with low-income.

According to an analysis of 2002 CCHS data, at-risk and problem gamblers are more likely to be male, younger in age, and have less than post-secondary education than non-problem gamblers.<sup>23</sup>

There is growing concern that adolescents represent a high risk group for gambling and gambling-related problems.<sup>7</sup> According to a number of studies, rates of problem gambling among youth are higher than those reported by adults.<sup>24, 25</sup> In the Centre for Addiction and Mental Health's (CAMH) 2009 Ontario Student Drug Use and Health Survey (OSDUHS), problem gambling was seen in 2.8% of the sample.<sup>24</sup> These results suggest that there are approximately 29,000 students across the province who are problem gamblers.

There is also evidence associating casinos with increased problem gambling and associated behaviours among college and university students, including increased alcohol and drug use.<sup>26, 27</sup> One study considered proximity of casinos, and noted that students close to a casino had more severe gambling problems than students far from a casino.<sup>28</sup>

Older adults have been identified as a group that may be particularly vulnerable to the impacts of problem gambling,<sup>6</sup> though the evidence on health impacts is mixed. While older adults do not have higher prevalence of problem gambling compared to other age groups, a number of studies report that problem gambling is associated with worse physical and psychosocial health among older adults.<sup>18, 29</sup> This has been theorized to be related to complex co-morbidities and co-dependencies and lessened ability and time to recover from the health complications, psychological and social problems, and financial difficulty that may follow problem gambling.<sup>18</sup> There is some evidence for positive or neutral impacts from *recreational* gambling among older adults, and there is at least one study finding that casinos have psychological benefits for older adults.<sup>18, 30</sup>

People of Aboriginal descent have significantly higher risk of problem gambling. The prevalence of problem gambling among Aboriginal peoples in Canada is reported to be approximately four times higher than found in non-Aboriginal populations.<sup>31</sup> It has been suggested that sociodemographic characteristics of the Aboriginal population, such as younger average age and a range of disadvantageous social conditions (e.g. poverty, unemployment, lack of education, cultural stress) may be a contributing factor to high rates of problem gambling.

A casino has the potential to contribute to or exacerbate social inequalities. There is evidence that the introduction of gambling has a differential impact on people of different socioeconomic levels. A review of gambling studies reported that lower income people contribute a higher proportion of their income to gambling than people in middle and high income groups.<sup>3</sup>



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## 3. Problem Gambling

### 3.1 Factors Contributing to Problem Gambling

A recent review suggests that availability of gambling opportunities is related to gambling behaviour.<sup>3</sup> Jurisdictions that have looked at availability issues, including accessibility and proximity, on gambling and problem gambling include Ontario, Canada, the United States, Scotland and New Zealand.

#### Availability

Evidence suggests the availability of casinos is directly associated with gambling behaviour. A number of before and after studies suggest an increase in problem or pathological gambling rates after gambling expansion.<sup>32, 33, 34</sup> Of 33 studies looking at gambling rates before and after introduction of casinos, two-thirds found an associated increase in problem gambling and/or social impacts.<sup>35</sup> A study examining the rates of pathological gambling in Niagara Falls, Ontario reported that rates increased from 2.2% prior to the casino opening to 4.4% one-year after the casino opening.<sup>33</sup> Impacts of charity casinos on four Ontario communities (Lambton County - Sarnia, Algoma County - Sault Ste. Marie, Brant County - Brantford and Thunder Bay) have also been evaluated. While overall problem gambling rates remained stable at 2.4% before and after charity casino openings, there was an overall increase in pathological gambling (the most severe form of problem gambling) from 1.5% to 2.5% across all communities. Algoma was the only community to experience significant gains in both problem and pathological gambling. With the exception of Lambton, all communities reported increases in problem gambling rates for at least some subpopulations.<sup>31</sup> In a study that examined the impacts of gambling expansion in four communities in British Columbia (City of Vancouver, City of Surrey, City of Langley and Langley Township), the City of Langley was the only community where rates of moderate problem gambling increased from 2% prior to 5.4% two years after gambling expansion in 2005. Langley was also the only city without a previously existing casino.<sup>36</sup> Furthermore, high concentrations of gambling venues in the community have been associated with higher rates of problem gambling in provinces across Canada.<sup>37</sup>

Some studies have reported increased gambling participation but no effect of gambling expansion on problem gambling rates. Analysis of gambling rates before and after the opening of a casino in Windsor, Ontario showed that while gambling participation increased from 66% before the opening of the casino to 82% one year after the opening of the casino, rates of problem and pathological gambling remained stable.<sup>38</sup> Similarly, a longitudinal pre/post study with two follow-up time periods and a comparison group conducted in Quebec reported an increase in gambling participation one year after the opening of a casino; however, participation rates declined when measured two and four years later. No significant increases in problem or pathological gambling rates were reported at any time period. However, respondents who resided in Hull, where a new casino was opened, were significantly more likely to report an individual in their household with a gambling problem four years after the casino opening compared to the comparison city.<sup>39</sup> These findings may be less relevant to Toronto because VLTs are widely available in Quebec whereas they are not permitted in Ontario.

It is hypothesized that the effects of gambling expansion are experienced during the initial stages of expansion and are less likely to occur after extended exposure or adaptation.<sup>3</sup> Further support for this theory comes from the study of gambling expansion in British Columbia. The effects of pre-existing casinos in Vancouver and Surrey may explain the lack of change in problem gambling rates in those two cities.<sup>36</sup> It should also be noted that studies that reported no effect of gambling expansion on problem gambling rates tend to have been conducted after longer time periods compared to those reporting negative effects.

While not all studies have consistently reported negative effects associated with gambling expansion, the overall conclusion is that increased availability of gambling is associated with increased rates of problem gambling. Differences in the types of studies conducted, their geographical locations and measurement tools used do not allow for predictions on the size of the change in problem gambler rates or on how long any increase is sustained.

## **Proximity**

Evidence suggests that gamblers gamble close to home. An Ontario study examining regional variation in access to gambling reported that problem gambling is modestly but significantly associated with proximity to casinos and racetracks with slot facilities.<sup>40</sup>

In New Zealand, the Ministry of Health analyzed survey data from 12,529 respondents in relation to gambling accessibility.<sup>41</sup> Analysis revealed that being a problem gambler was significantly associated with living closer to gambling venues. People who live in neighbourhoods within walking distance (800m) or close driving distance (5 km) to a gambling venue were more likely to have gambled in the last year, and be a problem gambler who had gambled at a gambling venue in the past year.

Higher rates of problem gambling have also been found for people who live with access to casinos at distances of 10 miles (16 km) and 50 miles (80 km) away, compared to those who live farther away.<sup>42, 43</sup> These studies, which have primarily been conducted through national telephone surveys in the United States, tend to report about twice the rates of problem and pathological gambling occurring within the identified perimeter as opposed to beyond those distances. This evidence provides support for an accessibility effect to problem gambling, where living close to a casino is linked to problem gambling.

## **Ease of Access / Getting There**

A casino located anywhere in the GTA will increase access to gambling opportunities, with a greater effect on closer communities compared to those further away. Ease of access to gambling is not just an issue of physical proximity, but also an issue of getting there, such as how accessible the site is by walking, public transit and driving. Therefore the issue of access concerns not only those who reside and work in proximity to a casino, but also anyone who is able to get there with relative ease.

A Montreal Public Health (2005) report provided an assessment of the potential consequences of moving an existing casino to the Peel Basin, an area of Montreal closer to residential areas and the downtown core.<sup>44</sup> The residents surrounding the proposed casino site were reported to be amongst the most vulnerable in the city, with lower incomes, lower levels of educational attainment, and higher numbers of reported health problems and hospitalizations compared to the average Montreal resident. The report assessed the existing context and environmental features of the Peel Basin, such as the public transportation infrastructure (i.e. number of subway stations) compared to the existing location. It was noted that the location change would make a Montreal casino more accessible by foot and public transit, which could have increased gambling opportunities for Montreal residents overall, and for vulnerable populations in particular, because of geographic and economic accessibility.

## **Neighbourhood Factors**

The impact of a casino can vary from locale to locale, depending on existing communities, economies and infrastructures in the area.<sup>45</sup> It has been suggested that existing neighbourhood factors may contribute to the potential social and health impacts on residents, and therefore, decisions on siting a new gambling

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venue should take the 'local impact' into account.<sup>46</sup> There may be some types of neighbourhoods/communities for which a casino may have greater negative health impact than others.

Although empirical studies relating gambling to neighbourhood characteristics are sparse, within most jurisdictions the sociodemographic characteristics associated with problem gambling (outlined in section 2.2 of this report) are found disproportionately in neighbourhoods with lower socioeconomic profile. Studies have found that poorer neighbourhoods are positively associated with problem and pathological gambling.<sup>42</sup> The effect of neighbourhood disadvantage was found even when controlling for respondents' socioeconomic status.

## **Gambling Modalities and Venues**

Certain gambling modalities may carry a higher risk that their users will develop gambling problems or that existing gambling problems will be exacerbated.<sup>8</sup> Evidence points to continuous forms of gambling, such as EGMs including slot machines and video lottery terminals (VLTs) (currently not permitted in Ontario), as most problematic. The high-risk nature of EGMs is theorized to be related to the fast speed of play and sophistication of the machines, which through mathematical algorithms and interactive technology, promote small wins, false beliefs about the amount of control the player has (e.g. near misses and stop buttons) and dissociative states.<sup>8</sup>

According to a study using 2002 CCHS data for Canada, the highest prevalence of gambling problems are found in the provinces with permanent casinos combined with the highest concentrations of EGMs.<sup>37</sup> The primary problem habits cited by problem gamblers in treatment and by callers to the Ontario Problem Gambling Helpline are slot machines and card gambling at casinos.<sup>47</sup>

Gambling venue features may have an impact on gambling behaviour and problem gambling. CAMH's Gambling Policy Framework expresses concern over extended hours of operation, such as casinos that are open 24 hours a day, seven days a week. Different jurisdictions vary in the policies related to hours of operation, some requiring closure of a gambling venue at specific times, others allowing all day access.<sup>35</sup> For example, in Winnipeg, casinos are open from 10:00 a.m. to 10:00 p.m. each day in the summer, but close at dusk during other months. Some hours of operation restrictions relate only to specific types of gambling. For example, in Alberta, EGMs are open for 17 hours each day, whereas table games are available for 14 hours.<sup>10</sup> The theory is that reducing hours of operation reduces availability and therefore minimizes the likelihood of harm. It has been reported that a disproportionate number of problem gamblers play EGMs, one of the most addictive gambling modalities, between midnight and closing.<sup>8</sup> Although evidence on the effectiveness of hours of operation policies is limited, there are parallels to reducing alcohol related harms by limiting hours during which alcohol is served.<sup>10</sup>

## **Casino Employment**

It is important to acknowledge that if there is an increase in employment through a casino and associated development, there could be a benefit to health. Income and employment, can impact health in a positive way depending on the types and quality of jobs.

Studies of casino employees have found increased rates of problem gambling in this group compared to the general population.<sup>48</sup> A recent study in Ontario found that casino employees had problem gambling rates three times as high as the general population. Hypothesized reasons include increased rates of gambling participation among new employees because of greater exposure and people with a history of gambling being attracted to the casino industry.<sup>49</sup>

## 3.2 Health Impacts of Problem Gambling

This section explores the potential public health impacts of access to gambling through a casino. In a comprehensive review of the literature on the social and economic impacts of gambling, the most consistent social impact of gambling is increased problem gambling prevalence and its related indices (i.e. personal bankruptcy rates, divorce rates, suicide rates, numbers accessing treatment).<sup>3</sup> These indices are often difficult to measure and difficult to attribute to gambling alone. Nonetheless, there is fairly strong evidence that the impacts of gambling are relevant to the health of individuals, families and communities and may have serious direct or indirect consequences.<sup>50</sup> Much of the research literature supports the notion that gambling problems often co-exist with other conditions, such as poorer physical or mental health or substance use problems. This section outlines the evidence on the health impacts of problem gambling in five sections that cover general health, mental health, co-addictions or dependencies, suicide and family and community impacts. (For a summary of the health impacts reported in the literature and associated references, see Table 2.)

**Table 2: Health Impacts Associated with Gambling Reported in the Literature and References**

Health Impacts	References
<b>General Health</b>	
Lower self-reported general health and well-being	3,50,53 ,55
Colds and influenza	54
Headaches, including severe and chronic headaches and migraines	53,54 ,56
Fatigue and sleep problems	8,54 ,57
Health conditions such as chronic bronchitis and fibromyalgia	53,54,55,56
Other miscellaneous health symptoms (including cardiovascular, cognitive, skin and gastrointestinal problems, heart burn, backache) that may be stress-related	
<b>Mental Health</b>	41,50,58
Stress	50,56,58
Depression	50,58
Mood, anxiety and personality disorders	
<b>Co-dependencies</b>	
Alcohol, tobacco and drug use	46,56,58,59
Problematic substance use/addiction	56,58
<b>Suicide</b>	50,60 ,62
<b>Family and Community Impacts</b>	
Financial problems	3,56
Alcohol or fatigue-related traffic fatalities	63,64
Family breakdown and divorce	3,56
Family/intimate partner violence	65
Child development, neglect and poverty	56,66

Prepared by: Toronto Public Health



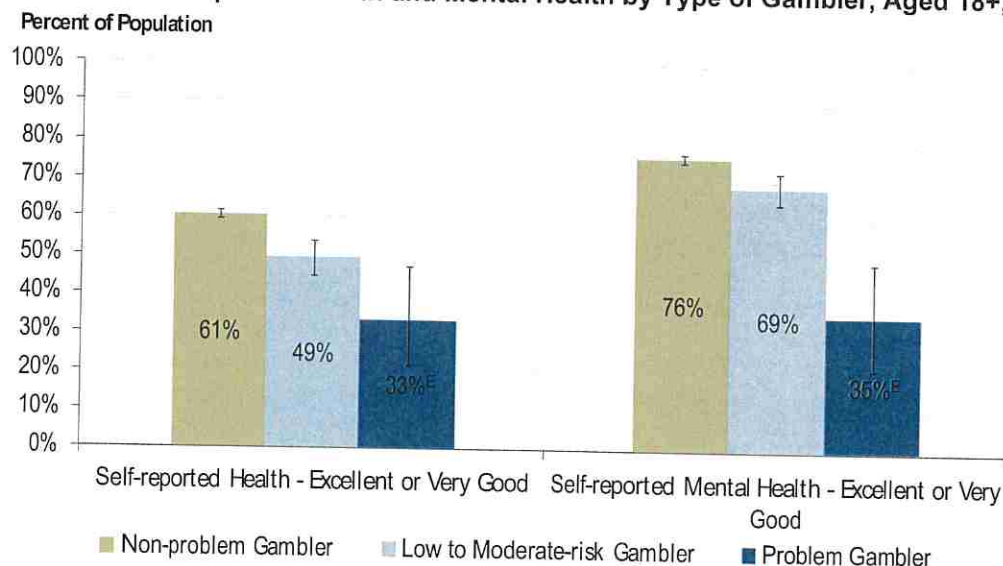
## General Health

A recent review reported a well-established association between heavy involvement in gambling and lower well-being and satisfaction with life.<sup>3, 38</sup> Self-reported general health is widely used as an indicator for overall health and well-being. Research has shown that self-reported health status may be a predictor of future mortality<sup>51</sup> and the development of chronic conditions.<sup>52</sup> According to TPH analysis of 2007/08 CCHS data for Ontario, as the level of risk for problem gambling increases, self-reported health significantly decreases – 61% of non-problem gamblers rated their health as excellent or very good compared to 49% of low to moderate-risk gamblers and 33%<sup>E</sup> of problem gamblers (Figure 2). Seventy-seven percent of problem gamblers reported gambling as the cause of health problems compared to 11% of low to moderate-risk gamblers (Figure 3). (See data notes in Appendix B for more detailed information on health problems as a PGSI item).

There is evidence to suggest an association between problem gambling and physical health problems. Problem gambling research from various jurisdictions and with different subpopulations has found a broad range of negative health correlates.<sup>50, 53, 54, 55, 56</sup> A number of studies have reported that problem gambling is related to headaches (including chronic and severe headaches and migraines).<sup>53, 54, 56</sup> While data is sparse, research has also suggested a number of other physical health symptoms and conditions with possible association with problem gambling, including colds and influenza, cardiovascular, cognitive, skin and gastrointestinal problems, heart burn and backache, and chronic bronchitis and fibromyalgia.<sup>53, 54, 55, 56</sup> Many of the health impacts are theorized to be a function of stress and strain.<sup>41</sup>

Problem gambling is also suggested to be correlated with severe fatigue and sleep problems. An American study reported that decreased sleep and sleep quality is seen in problem and pathological gamblers.<sup>57</sup> It has been speculated that gamblers may sometimes go days without sleep to gamble, and some gamblers may experience extreme stress and loss of sleep during phases of continuous losses.

**Figure 2: Self-Reported Health and Mental Health by Type of Gambler, Aged 18+, Ontario, 2007/08**

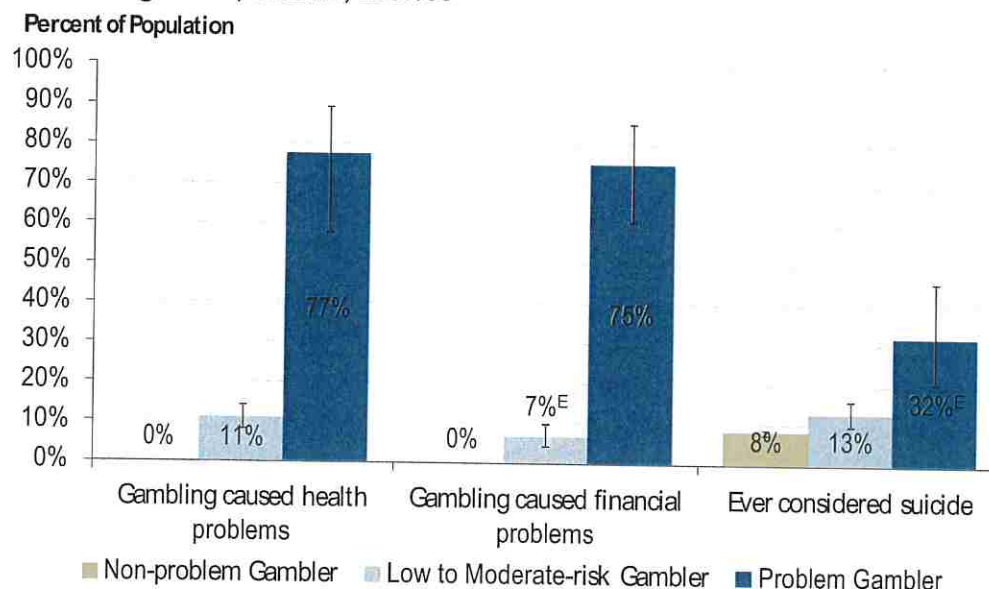


Notes: (1) Gambling classifications are based on a modified version of the nine-item Problem Gambling Severity Index (PGSI), part of the Canadian Problem Gambling Index (CPGI). (2) Error bars (I) denote 95% confidence intervals. E – Moderately high sampling variability; interpret with caution. Low-risk and Moderate-risk gamblers were combined due to small sample sizes. See Appendix for the full data table.

Data Source: Canadian Community Health Survey, 2007/08. Statistics Canada, Share File, Knowledge Management and Reporting Branch, Ontario Ministry of Health and Long-Term Care.

Prepared by: Toronto Public Health

**Figure 3: Health Impacts Reported "At least Sometimes" in Past 12 Months by Type of Gambler, Aged 18+, Ontario, 2007/08**



Notes: (1) Gambling classifications are based on a modified version of the nine-item Problem Gambling Severity Index (PGSI), part of the Canadian Problem Gambling Index (CPGI). (2) Error bars (I) denote 95% confidence intervals. (3) "At least sometimes" is an aggregate of almost always, most of the time and sometimes in the past 12 months. E – Moderately high sampling variability; interpret with caution. Low-risk and Moderate-risk gamblers were combined due to small sample sizes. See Appendix for the full data table. Gambling caused health problems and financial problems are part of the PGSI and were used to classify type of gambler. Given this, we would anticipate significant differences between gambler types; however, these differences are still meaningful and illustrate the level of differentiation in behaviour between problem gamblers and lower risk gamblers.

Data Source: Canadian Community Health Survey, 2007/08. Statistics Canada, Share File, Knowledge Management and Reporting Branch, Ontario Ministry of Health and Long-Term Care.

Prepared by: Toronto Public Health

## Mental Health

Similar to self-reported general health, as the risk of problem gambling increases, self-reported mental health significantly decreases. In TPH analysis of 2007/08 CCHS data for Ontario, 76% of non-problem gamblers rated their mental health as excellent or very good compared to 69% of low to moderate-risk and 35%<sup>E</sup> of problem gamblers (Figure 2).

There is also evidence in the literature of an association between gambling and mental health disorders. Studies using population surveys report a higher prevalence of conditions such as depression, stress, and mood, anxiety and personality disorders in problem and pathological gamblers.<sup>50, 58</sup> The Australian Productivity Commission's (1999) review of the gambling industry, with a specific focus on problem gambling, reported that around half the people with at least moderate gambling problems said they suffered depression as a result of gambling at some time, and a similar proportion say they have been depressed because of gambling in the last year.<sup>56</sup>

## Co-Dependencies

Considerable attention has been paid to the relationship between gambling and substance use. According to TPH analysis of CCHS data, 33% of problem gamblers in Ontario reported using alcohol or drugs while gambling in the previous 12 months. In addition, CCHS data for Ontario shows that low to moderate-risk (30%) and problem gamblers (38%) are significantly more likely to be daily smokers

compared to non-problem gamblers (19%). The literature also supports the relationship between problem gambling and alcohol and drug use.<sup>3, 46, 56, 58, 59</sup> High rates of co-morbidity have been found between gambling and problem substance use/addiction, with estimates that one in five problem gamblers suffers from alcoholism or other dependencies.<sup>3, 56, 58</sup> The existence of co-dependencies and related morbidities underlines the complex causality of problems experienced by problem gamblers, where problem gambling may exacerbate other dependencies, and they in turn may exacerbate problem gambling.

## **Suicide**

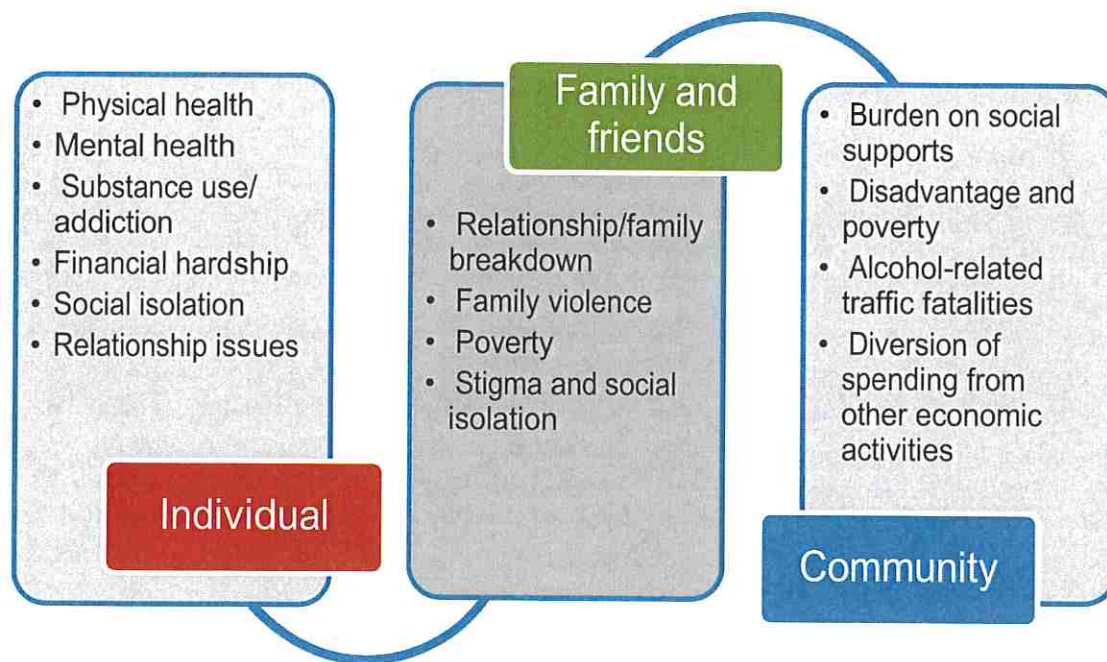
The gambling literature examines the relationship between gambling and suicide. According to TPH analysis of 2007/08 CCHS data for Ontario, a significantly higher proportion of problem gamblers reported having thoughts of committing suicide in their lifetime compared to non-problem gamblers (Figure 3). The review by Williams *et al.* (2011) found mixed results on suicide rates: three studies reported the introduction of gambling was associated with an increase in suicides and three studies reported no impact.<sup>3</sup> Nevertheless, research on suicide from various jurisdictions suggests that there is reason for concern. Las Vegas has had one of North America's highest per capita suicide rates for the past 50 years.<sup>60, 61</sup> A study of gambling in Alberta estimated that 10% of all suicides in Alberta are gambling-related.<sup>50</sup> The Quebec Coroner's Office, in an examination of cases between 1994 and 2000, was able to identify 74 suicides as gambling-related since the opening of the province's first casino in Montreal in 1993.<sup>62</sup> While it is difficult to establish the actual number of suicides as a result of gambling, the high numbers of suicides that appear to be gambling-related suggests that this is an important public health concern.

## **Family and Community Impacts**

While consideration of the characteristics and correlates of people directly affected by gambling is important, a complete understanding of impact is gained only by outlining the 'ripple effects' of problem gambling. Problem gambling can affect more than just the individual gambler, resulting in impacts for friends, families, colleagues, employers and communities (Figure 4). Given that some problem gamblers are married and have children, it has been estimated that the proportion of people whose quality of life may be negatively impacted by problem gambling is actually three or four times the rate of problem gambling prevalence in the general population.<sup>3</sup>



**Figure 4: Potential Impacts of Problem Gambling**



Prepared by: Toronto Public Health (adapted from Wyndham City. *Responsible Gambling Strategy 2012-2014*. <http://www.wyndham.vic.gov.au/generic/file-widget/download/id/4268> )

Financial difficulties are typically the most common problem reported by problem gamblers.<sup>3</sup> As noted earlier, an increase in bankruptcies is a consistent finding reported in a review of the impacts of gambling.<sup>3</sup> Financial difficulties can produce adverse effects such as the inability to pay for essentials such as food or housing, which are issues of public health concern.<sup>56</sup>

Research has revealed a link between the presence of a casino and an increase in driving while impaired or extremely tired.<sup>8</sup> One study noted an increase in alcohol-related traffic fatalities in communities close to casinos, although the authors noted that this impact decreased as regional population size increased, likely being related to the greater distances driven from casinos in rural or moderately sized counties.<sup>63</sup> A study from Connecticut noted that communities with close proximity to casinos experienced an increase in arrests for 'DUI', or 'driving under the influence of alcohol'. Roughly 20% of motorists arrested for DUI acknowledged to police that their last drink was at a casino.<sup>64</sup>

Research has found that problem gambling is associated with family breakdown, divorce rates, intimate partner violence, and a variety of familial psychological problems including stress and loss of trust.<sup>3, 56, 65</sup> Analysis of 2007/08 CCHS data for Ontario supports conclusions for these impacts on familial relationships and well-being. In the previous 12 months, 75% of problem gamblers reported gambling as the cause of financial problems for their families (Figure 3), 62% of problem gamblers reported lying to their family members and others about gambling, and 30% reported gambling as the cause of problems with relationships with family or friends. These types of impacts were rarely reported by non-problem gamblers.

Gambling has been reported to produce indirect consequences for the problem gambler's friends and families, such as emotional distress, depression, and even suicide.<sup>22</sup> It may also negatively affect child



development and well-being. The Australian Productivity Commission (1999) reported that the most immediate concern for children's welfare in problem gambling households is poverty.<sup>55</sup> Other studies have suggested that children in gambling families are at a greater risk for adopting health-threatening behaviours such as smoking and alcohol or drug use, psychosocial problems, educational difficulties and emotional disorders in adolescence and later in their adult lives.<sup>66</sup>

## 4. Intervention

### 4.1 Intervention Options and Effectiveness

There is a large array of problem gambling intervention options, many of which have been implemented in different jurisdictions. While there is considerable interest in preventing and mitigating the potential harm from gambling, much remains unknown about the effectiveness of individual initiatives. This section of the report outlines prevention, early identification and responses to problem gambling.

Public health approaches favour primary prevention, which aims to reduce the prevalence of and risks associated with gambling problems (Figure 5).<sup>67</sup> Common measures include changes to the environment (including policy and regulation), changes to the nature of the product, and changes in the understanding and views that influence patterns of consumption/participation. In contrast to the individualized focus inherent in approaches to treatment, primary prevention shifts the focus to the context and environment in which harmful consumption/exposure is occurring. It has been suggested that few jurisdictions have looked seriously at investing in public health responses to gambling expansion, and efforts tend to concentrate primarily on establishing treatment services.<sup>67</sup>

Figure 5: Gambling continuum and related public health interventions



Adapted from: Korn, D., Gibbins, R. & Azmier, J. (2003). *Journal of Gambling Studies*, 19,2: pg. 245.

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## Prevention

One aspect of primary prevention includes educational initiatives, which are intended to change internal knowledge, attitudes, beliefs, and skills so as to deter an individual from problem gambling.<sup>9</sup> This can include initiatives such as public awareness campaigns, training and programs.

Public information/awareness campaigns (and associated mass media campaigns and social marketing) tend to be a way of delivering preventive health messages to a large portion of the population.<sup>9</sup> There is however, limited research on impact of awareness campaigns vis-à-vis gambling. Literature suggests that public information/awareness campaigns may improve people's knowledge, but there is no direct evidence of effectiveness as a primary prevention tool for problem gambling (i.e. to prevent individuals in the general populace from becoming problem gamblers).<sup>9</sup>

There is an array of programmatic initiatives for youth and adults, with mixed results on the effectiveness of these programs for preventing problem gambling.<sup>9</sup> These programs range from being topic-specific (e.g. explaining gambling fallacies) to broad in scope (e.g. building esteem and peer resistance training). The actual impact of programs on problem gambling behaviour is difficult to measure and, as a result, largely unknown. There have been very few published evaluations of programs, and in many cases, there may be concern around the quality of studies, such as not having pre/post-measures, control groups, or examination of long-term outcomes. Nevertheless, recent experimental research gives some reason to be positive about the potential effects of educational/ programmatic interventions. A study of problem gambling prevention programs with youth in Ontario reported positive effects of a curriculum that educated students about probability and the nature of random events and their connection to problem gambling.<sup>68</sup>

Policy initiatives are intended to prevent problem gambling through the alteration of external environmental controls on the availability and provision of gambling.<sup>9</sup> Typically these policies take the form of restrictions on the general availability of gambling, who can gamble, and how gambling is provided. Examples include: restricting harmful types of gambling (e.g. EGMs); limiting speed of gambling; and restricting the location and hours of operation of gambling venues.

A policy example that has been reported to have potential as an effective intervention is restricting concurrent consumption of alcohol while gambling.<sup>9</sup> Casinos in Canada are not allowed to provide free alcoholic beverages as is the case in many casinos in the United States.<sup>35</sup> With respect to liquor sales, municipal governments assume responsibility for licensing decisions. In some jurisdictions, such as in parts of British Columbia, alcohol service is prohibited in some casinos. This is reported to hold significant potential as a harm minimization strategy.<sup>9</sup>

## Problem Gambling Responses

There are a range of interventions designed to respond to problem gambling. This can consist of early identification, on-site interventions, and various forms of treatment, including pharmacological and psychological interventions.

Early identification of problem gambling often includes recognition of early signs by primary care providers. According to CAMH's Problem Gambling Institute of Ontario, identifying patients with gambling problems and providing information, treatment and referral is part of the overall spectrum of health care provided by physicians.<sup>69</sup> It has been suggested that early identification of problem gambling improves patients' outcomes and reduces the harm to themselves and their families.

Pharmacological treatments mainly involve administering drugs such as anti-depressants, opioid antagonists and mood stabilizers.<sup>70</sup> Psychological treatments can include different types of therapy and counselling, brief interventions, and support programs, such as Gamblers Anonymous.<sup>71</sup> These interventions may be administered to individuals or groups, and the duration of treatment can vary from immediate crisis intervention to ongoing long-term treatment. Online and self-help interventions have been identified as potentially effective, particularly to those problem gamblers who have earlier onset and less severe gambling problems, although Internet gamblers cite being more comfortable with face-to-face counselling rather than online interventions.<sup>14</sup> The overall aims of treatment may vary from abstinence to controlled gambling to prevention of relapse.

Systematic reviews of pharmacological and psychological interventions reveal that problem gambling is amenable to intervention.<sup>71</sup> However, evidence is limited by the lack of long-term follow up in many studies, which limits understanding of the impact of interventions over time. Furthermore, many studies are compromised by methodological limitations, such as small sample sizes, non-randomization, high drop-out rates and unrepresentative samples. Experts identify that further large-scale, well-controlled studies with long-term follow-up are needed.

On-site interventions are also frequently employed in response to problem gambling. Many casinos and jurisdictions around the world have adopted self-exclusion programs. Voluntary self-exclusion is a self-help tool offered to people who wish to limit or stop their gambling. Self-excluders make a voluntary, written commitment to stay away from all gaming facilities. The role of the gaming operator (e.g. OLG) is mainly to monitor, detect and prevent self-excluders' re-entry.<sup>72</sup> It is estimated that 0.6-7.0% of problem gamblers sign up to self-exclude in Canada.<sup>3</sup>

Evidence is limited on the effectiveness of self-exclusion programs. Self-exclusion programs are largely dependent upon the ability of casinos to identify self-excluders in order to detect and report violations of the self-exclusion agreement. A review of studies shows self-exclusion programs are often ineffective at detection and enforcement.<sup>72</sup> Venue security personnel are typically responsible for enforcing self-exclusion policies, yet it is common for breaches to occur and to go undetected. One study of individuals self-excluded from a casino in Quebec reported that 36% breached their exclusion contract and returned to the casino, many of whom went back numerous times (median 6 times) during this period.<sup>73</sup>

Reports suggest that casinos have few systematic procedures in place to implement self-exclusion.<sup>72</sup> Self-exclusion agreements do not generally constitute a formal contract enforceable by law. Yet a program that is not capable of enforcing self-exclusion is likely to be ineffective.

## 4.2 Problem Gambling Interventions in Ontario

This section provides an overview of problem gambling interventions in Toronto and Ontario, as well as an analysis of the approaches and challenges.

### Funding

In 1996, Ontario introduced a Problem Gambling Strategy managed under the Ontario Ministry of Health (now the Ministry of Health and Long-Term Care).<sup>74</sup> Provincial policy has dedicated a proportion of gambling revenue (2%) to problem gambling interventions. It has been publicized that Ontario allocates more money for gambling intervention than any other jurisdiction in the world, with this 2% formula directing approximately \$36 million annually for the prevention, treatment and research of problem gambling (Table 3).<sup>74, 75</sup>



**Table 3: The Funding Allocation to the Ontario Problem Gambling Strategy, 2004/05**

Intervention	Funding allocation (percent of total)
Treatment (including \$4.2M for multiple addictions)	\$24.17M (66%)
Prevention/Awareness	\$8.47M (23%)
Research	\$4.01M (11%)
<b>TOTAL</b>	<b>\$36.65M (100%)</b>

Data Source: Review of the Problem-Gambling and Responsible-Gaming Strategy of the Government of Ontario. Report to the Ontario Ministry of Health and Long-Term Care and the Ministry of Economic Development and Trade by S. Sadinsky (2005).

Treatment is the top priority within Ontario's problem gambling interventions.<sup>74</sup> A report to the Ontario Ministry of Health and Long-Term Care and the Ministry of Economic Development and Trade by expert Stanley Sadinsky, commissioned by the Government of Ontario, analyzed the Problem Gambling Strategy. The report raised concern about the priority placed on the treatment component of the Strategy, suggesting that treatment has been over-funded to the detriment of the prevention/ awareness component.<sup>74</sup>

## Interventions

A number of organizations and stakeholders are involved in providing gambling interventions in Toronto and Ontario. This includes initiatives by the OLG, Responsible Gaming Council Ontario, CAMH's Problem Gambling Institute of Ontario, the Ontario Problem Gambling Research Centre, and more than 50 community agencies located throughout the province, including five in Toronto.<sup>76</sup> Many of these organizations and initiatives receive funding from the Ontario government's Problem Gambling Strategy, while others have other sources of funding. (See Appendix D for a list of Ontario gambling organizations and descriptions.) Interventions available in Toronto and Ontario include:

Public awareness and information campaigns: There are a number of initiatives in Toronto and Ontario that focus on awareness and information around problem gambling. OLG sponsors public awareness advertising campaigns aimed at increasing awareness, changing behaviour and building public confidence.<sup>77</sup> Examples of OLG public awareness efforts include: the website [www.knowyourlimit.ca](http://www.knowyourlimit.ca), which provides information about how gambling works, myths and facts, game odds and other responsible gambling initiatives; and advertising campaigns to raise awareness of slot machine risk factors. OLG also engages in public outreach via presentations to community groups.

Other public awareness initiatives include mass-media social marketing campaigns by the Responsible Gambling Council, an independent non-profit organization dedicated to problem gambling prevention. Their social marketing campaigns are conducted for a range of demographic groups at risk or affected by problem gambling, including friends of young people, significant others and older adults.<sup>78</sup> Another public awareness initiative in Ontario was Problem Gambling Prevention Week, which took place between September 26 and October 2 in 2011. This community-based awareness program is organized by the Responsible Gambling Council in conjunction with partner organizations across Ontario.<sup>78</sup>

Public education: There are a variety of educational programs related to problem gambling in Toronto and Ontario, which include outreach, curriculum development, teaching and training. CAMH's Problem Gambling Institute of Ontario develops and distributes resources for people affected by problem gambling, their families and for health professionals such as by providing a curriculum for teachers, a series of information guides and the website [www.ProblemGambling.ca](http://www.ProblemGambling.ca).<sup>79</sup>



In addition, there are Ontario problem gambling educational programs specifically targeting youth populations. The Responsible Gambling Council runs high-school drama tours and interactive on-campus and online programs for university and college students.<sup>78</sup> The YMCA offers free services across Ontario focusing on knowledge-building, community involvement and youth engagement around problem gambling for youth and students starting as young as age 8 and through to 24 years.<sup>80</sup> Their work consists of curriculum support, harm reduction presentations and activities led by youth outreach workers, as well as workshops for parents, teachers and health care professionals.

Research: There is also a variety of research on problem gambling being conducted in Ontario. The Ontario Problem Gambling Research Centre acts as a funding body to increase capacity in Ontario to conduct research on problem gambling and disseminate research findings.<sup>81</sup> In addition, CAMH's Problem Gambling Institute of Ontario collaborates with other researchers at CAMH, across Canada and internationally to influence policy, prevention and treatment activities. Finally, the Responsible Gambling Council's Centre for the Advancement of Best Practices is working to identify best practices that reduce the incidence of problem gambling.<sup>82</sup> Currently they provide access to published research and commissioned projects, and are working toward published independent standards for responsible gambling initiatives.

Treatment: Treatment services for problem gambling are available in Toronto and across Ontario. The Problem Gambling Institute of Ontario at CAMH provides individual and group counselling for those affected by problem gambling and their families.<sup>68</sup> In addition, the Ontario Problem Gambling Treatment Providers, agencies funded by the Ministry of Health and Long-Term Care, provide several treatment options and modalities such as group counselling, individual counselling, telephone counselling and home visits. Some services are directed at special populations such as women, seniors, youth and ethno-cultural populations (e.g. COSTI Immigrant Services and the Chinese Family Services of Ontario).<sup>76</sup>

The Ontario Problem Gambling Helpline, funded by the Government of Ontario, provides a toll-free 24/7 province-wide helpline for those affected by problem gambling and their family and friends, service providers and the general public.<sup>83</sup> It links individuals with problem gambling treatment resources, provides listening and support, information about treatment, credit and debt services, family services, self-help groups and other resources.

On-site programs and policies: OLG launched a Responsible Gaming Code of Conduct in 2005. This is a corporate commitment to information, education and creating a responsible gaming environment.<sup>84</sup> OLG introduced Responsible Gaming Resource Centres at all gaming sites in Ontario, which are independently operated by the Responsible Gambling Council. OLG has also collaborated with the Problem Gambling Institute of Ontario at CAMH to implement Responsible Gaming Training programs that provide specialized training and support for all managers at OLG. With respect to environmental features, OLG has introduced clocks on the gaming floor at each OLG gaming site in Ontario, as a measure to help with responsible gambling practices. It has traditionally been common for casinos to not have clocks on casino floors, which makes it more difficult for gamblers to track the time they are spending participating in gambling activities.

OLG offers voluntary self-exclusion in collaboration with CAMH.<sup>85</sup> OLG's self-exclusion program began at Casino Windsor in 1995, followed by Casino Rama and Casino Niagara in 1996 and 1997, respectively. In 1999, the self-exclusion program was revised and extended to apply to all OLG gaming sites, as remains the policy today. OLG's current self-exclusion practices include detecting self-excluders through face recognition at casino entry, removing self-excluders' names from the corporation's marketing database, and connecting individuals with available treatment providers.

Other policy initiatives undertaken by OLG include refraining from extending credit at casinos, and introducing and implementing a fatigue impairment policy, which trains gaming staff to assess patrons for signs of fatigue, and respond according to escalation procedures.<sup>9</sup> OLG staff will also direct patrons who are seeking help to appropriate counselling services.

## **Utilization of Intervention Resources and Services**

Research reveals that only a minority of problem gamblers seek or receive treatment.<sup>3</sup> In Ontario, it is estimated that only 1% to 2% of people meeting criteria for problem gambling are seeking help from specialized treatment programs per year.<sup>86</sup> Analyses of who is seeking help in Ontario reveal an association with age and education. Problem gamblers who seek treatment services are more likely to have some post-secondary education, and the age distribution is bell-shaped, with the largest percentage of treatment-seekers falling within the age category of 35 to 44 years.<sup>41, 86</sup> These results suggest that the characteristics associated with problem gambling (as outlined in section 2.2 of this report) are very different from the characteristics associated with treatment-seeking. This may mean that those most vulnerable to the negative impacts of problem gambling may not be accessing help.

Research has examined factors that contribute to reluctance to seek help for problem gambling. In a review of those who hesitate to seek help, adult gamblers in Ontario most often mentioned obstacles having to do with shame and stigma and with difficulty acknowledging the problem or its seriousness.<sup>87</sup> Another study suggested the role of proximity in treatment-seeking, where problem gamblers living in close proximity to a gambling venue were less likely to be in treatment if the nearest treatment program was comparatively far away.<sup>41</sup> To increase utilization of problem gambling treatment services, treatment providers and funders will need to determine how to reduce barriers such as stigma, cost and geographic distance.

There is a need for further study of help-seeking patterns of problem gamblers, including examination of the role of general health and social services on problem gambling. Given the co-occurrence of problem gambling with other mental health and substance use problems, it is perhaps unsurprising that some problem gamblers seek intervention or treatment through more generic health professionals and non-specialists (e.g. family physicians, general practice psychiatrists, psychotherapists, community mental health programs, family counselling, credit counselling).<sup>76</sup> Few studies have addressed the prevalence of treating problem gambling in health care settings or studied the knowledge of providers in diagnosis and intervention in this area.<sup>88</sup>

## **Intervention Effectiveness**

Evidence is limited on the effectiveness of problem gambling interventions. While there has been some improvement in the evidence base, specifically around individual treatment programs, evaluation of interventions for problem gambling remains an area in need of further examination. To date, there have been few system-wide studies of problem gambling screening, assessment and treatment. Without this research, it is difficult to determine overall effectiveness of problem gambling interventions in Ontario.

A critical analysis of the effectiveness of problem gambling intervention in Ontario is needed to gain a better understanding of opportunities and challenges, and to identify evidence-based best practices. This could be achieved by more rigorous evaluation of current prevention and treatment services and research into gambling harm. It is critical that the Ontario government prioritize further independent research and evaluation, particularly involving population-level and longitudinal research. The research must go beneath the surface of the overall prevalence rate, to regular, systematic and adequately funded assessments of the health, social and economic impacts of gambling, and measurement of the costs on

individuals, families, treatment agencies, social services, the community and the health care system over time. This type of research would provide the data from which to monitor and evaluate overall intervention effectiveness, as well as to assess the potential over- or under- representation of particular groups (e.g. women, specific ethno-cultural groups, and youth) compared to the epidemiology of problem gambling in the community.

A shift in priorities may be required to move the current emphasis from treatment toward primary prevention, including research, education, public awareness and policy initiatives.

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## 5. Conclusions

In this report, we have reviewed evidence on the health impacts of increased access to gambling through a casino. Though the consideration of a casino comes in the context of increasing access to gambling overall, this report concentrates on casino gambling and does not examine other gambling activities in detail, such as online gambling, lotteries, and so forth. Where information on casinos is not available, literature dealing with gambling in general has been utilized. This report drew upon data from Toronto and Ontario when possible, though some of the literature reviewed consisted of data from other jurisdictions in Canada and internationally.

Toronto is a large urban setting where there is already some access to casino gambling. The introduction of a casino in the City of Toronto will increase gambling opportunities for its residents in a meaningful way. Hosting a casino in Toronto is anticipated to increase the frequency and severity of problem gambling in the city, which can produce negative health impacts on individuals, families and communities. As this report has outlined, many individuals in Toronto and Ontario gamble, and most do so without causing problems for themselves or others. There are, however, upwards of 11,000 people aged 18+ in the GTA who are serious problem gamblers, for whom gambling behaviour results in negative consequences. This report took a public health approach and examined the potential health and social impacts of problem gambling for individuals, families and communities.

Evidence supports the notion that availability and accessibility of casinos is a factor contributing to problem gambling prevalence. Given the possibility of a casino being located in Toronto or a neighbouring jurisdiction, it is important to consider the impact of proximity. Research from jurisdictions in Canada, the United States and New Zealand have found that proximity of gambling venues is positively associated with both gambling behaviour and problem gambling, leading us to predict that a casino located anywhere in the GTA will likely increase problem gambling and associated health risks for Toronto residents. Furthermore, this relationship has been found for residents who live up to 50 miles (about 80 km) away from casinos, thus raising the concern that a casino outside Toronto but still within the GTA (e.g. Mississauga, Markham) may result in adverse health impacts in Toronto, with greater impacts on closer communities.

As reviewed in this report, the evidence about the public health risks associated with problem gambling is fairly strong. Potential impacts of problem gambling include effects on physical health and mental health, including ill health, fatigue, co-related substance use and addiction, depression and suicide among others. These impacts occur alongside others such as alcohol-related traffic fatalities, financial difficulties, family breakdown, divorce and compromised child development that also affect the health and well-being of family, friends, colleagues and communities and are relevant to public health. Furthermore, given the role of sociodemographic characteristics and the local environment on the rates and effects of problem gambling, there is good reason to be concerned that certain groups may be particularly vulnerable to the negative impacts of a casino. These harms can be experienced by a sizable portion of people and to different degrees.

This report was limited in scope to the potential impact of gambling expansion on problem gambling. Employment, economic development, crime, motor vehicle traffic, and other community impacts were outside the scope of this report, though these factors affect the health and well-being of individuals, families and communities. These impacts could be positive or negative. For example, increased net income and employment could benefit health, whereas increased motor vehicle traffic could increase injuries and air pollution related illness.

There are policy implications for the City of Toronto of a new casino anywhere in the GTA. In order to protect and promote the health of all who live in the City, discussion of the anticipated negative health impacts of establishing a new casino in Toronto must adequately inform decision-making.

The anticipated adverse health impacts of gambling should be factored into decision-making. A health-based approach would refrain from increasing local gambling opportunities altogether. However, in the context of gambling expansion, strategies such as limiting accessibility, availability, harmful gambling modalities and concurrent risk factors should be strongly considered in an attempt to minimize the harms of problem gambling. A public health approach calls for a broad range of strategies and policies that prevent or mitigate gambling-related harm, promote healthy choices, and protect vulnerable or high-risk populations. Toronto Public Health has

While there currently exists a wide array of problem gambling intervention initiatives in Ontario and other jurisdictions, there is limited evidence on what is working and not working, particularly with respect to population-level factors or long-term impacts. As a result, we do not have sufficient evidence to be confident in our ability to protect at-risk and vulnerable groups, nor in our ability to achieve meaningful behavior change with problem gamblers.

Initiatives such as the CAMH's (2011) *Gambling Policy Framework*<sup>8</sup> are providing a model for Ontario's approach to gambling, but more research and policy work is needed to adequately understand how best to prevent and mitigate the health and social impacts of problem gambling.

The *Toronto Public Health Position Statement on Gambling and Health* was developed to reflect key findings of this Technical Report and to provide clear policy recommendations. The Position Statement highlights the impacts of problem gambling and of gambling expansion. The recommendations proposed provide casino site specific options and address gaps in research, prevention and treatment. The Position Statement should be used as a tool in policy development and evidence-based decision making.



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## Appendix A: Search Strategy

The first step in this goal involved identifying all studies reporting on the social/health impacts of casino gambling from both the academic and non-academic 'grey' literature. The following keywords and subject terms were used in various combinations to locate resources for this review of the literature: gambling / gaming / gambler\* / casino\* / effect\* / impact\* / socioeconomic / social impact / health impact / health

Search dates: 2011-present  
English only

Searches were performed in the following academic databases:

Gale databases: Academic OneFile, Expanded Academic ASAP, General Business File ASAP, General OneFile, Psychology Collection

EBSCO databases: Academic Search Premier, General Science Abstracts, Psychology and Behavioural Sciences Collection, Social Sciences Abstracts, SocINDEX

OVID database: Embase, Medline

Proquest databases: Applied Social Science Index and Abstracts, ERIC, PsycAbstracts, PsycInfo, Sociological Abstracts  
PubMed

Searches were performed using the following online search tools and repositories:

CAMH Research Database

Centers for Disease Control and Prevention (CDC)

Google Scholar

Responsible Gambling Council Online Library

University of Toronto Library Catalogue

The second step involved identifying all studies reporting on intervention options and effectiveness related to casino gambling. The following keywords and subject terms were used in various combinations to located resources for this review of the literature: gambling / gaming / gambler\* / casino\* / intervention\* / prevention\* / treatment

Search dates: 2009-present  
English only

Searches were performed in the following academic databases:

Gale databases: Academic OneFile, Expanded Academic ASAP, General Business File ASAP, General OneFile, Psychology Collection

EBSCO databases: Academic Search Premier, Cochrane Database of Systematic Reviews, Psychology and Behavioural Sciences Collection, Medline, SocINDEX

OVID databases: Embase

Sociological Abstracts

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## Appendix B: Data Notes

Methodological details regarding the CCHS (Statistics Canada, 2011) and CGPI (Ferris and Wynne, 2001) have been published elsewhere.

The CCHS analysis was based on weighted data. Respondents under 18 years of age were excluded from the analysis. In an approved CCHS modification, respondents were not asked the PGSI if they classified themselves as a non-gambler or reported gambling at most 1 to 5 times in the past 12 months for each of the 13 gambling activities measured. Questions pertaining to duration of involvement were not included in the CCHS. These estimates may under-estimate the true prevalence of problem gambling in Ontario. It has been suggested that CCHS data produces lower prevalence rates of problem gambling compared to other provincial studies due to a lack of anonymity. Unlike other provincial surveys, the CCHS collects respondent name and date of birth at the beginning of the interview (Williams, Volberg and Stevens, 2012).

Significant differences were estimated using overlapping confidence intervals. Although this method is conservative ( $\alpha < 0.01$ ) and most appropriate when comparing mutually exclusive groups, it was chosen as an objective way of making conclusions on survey data. Also note that the multiple comparisons performed in the analysis were not taken into consideration when choosing the level of significance to test.

Where a respondent did not respond to a survey question relevant to the analysis presented, they were excluded from both the numerator and the denominator.

'Refusal', 'Not Stated', and 'Don't Know' responses were excluded from analysis if they constituted less than 5% of the total responses; otherwise, they were reported separately.

### Limitations

Estimates for Problem gamblers using CCHS in this report were based on sample sizes. In some cases, this has contributed to wide confidence intervals. These estimates should be interpreted with caution. The Statistics Canada sampling variability guidelines were followed.

Low-risk and moderate-risk gamblers were combined due to small sample sizes. A validation study recently undertaken by Currie, Hodgins and Casey (2012) found that non-problem and problem gamblers were distinct subgroups; however, when profiled, low-risk and moderate-risk gamblers were similar on a number of dimensions and did not comprise meaningfully distinct groups. Currie *et al* (2012) suggested two methods to improve the validity of these groups: (1) combine the low-risk and moderate-risk groups or (2) revise the scoring system to classify low-risk gamblers (1 to 4) and moderate-risk (5 to 7). The latter is the preferred approach and is promoted by the Canadian Consortium for Gambling Research. Due to small sample sizes, we used the first approach to address the validity concern. A limitation of this approach is that it may be too inclusive (Currie *et al* (2012).

Some items were part of the PGSI and used to classify type of gambler. Given this, we would anticipate significant differences between gambler types; however, these differences are still meaningful and illustrate the level of differentiation in behaviour between problem gamblers and lower risk gamblers.

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Self-reported data from surveys have a number of limitations: (1) People do not always remember their behaviours, and/or may under- or over-report behaviours or characteristics based on perceived social desirability; (2) People living on Indian Reserves or Crown Lands, in institutions, members of the Canadian Forces and residents in specific remote regions were excluded from the CCHS sampling frame (Statistics Canada, 2011); and (3) People of low income, people with low levels of education and new immigrants are under-represented. Further, individuals with gambling concerns may be harder to contact and less likely to respond to a health survey over the telephone.

Telephone surveys have been found to underestimate the true prevalence of gambling. After weighting for age and sex, Williams & Volberg (2012) reported that the rates of problem gambling were 1.44 times higher in face to face surveys compared to telephone surveys; however, the underestimation rate is influenced by response rates. The higher the response rate, the lower the underestimation of problem gambling rates. The response rate for the 2007/08 cycle of the CCHS in Ontario was 73.6%.

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# Appendix C

**Table 4: Health Impacts Reported "At least Sometimes" in the Past 12 Months by Type of Gambler, Aged 18+, Ontario, 2007/08**

In the past 12 months...	Type of Gambler <sup>1</sup>					
	Non-problem Gambler		Low to Moderate-risk Gambler		Moderate to Problem Gambler	
	Percent	95% CIs <sup>2</sup>	Percent	95% CIs <sup>2</sup>	Percent	95% CIs <sup>2</sup>
<b>General Health</b>						
Self-reported Health - Excellent or Very Good	60.6%	(59.4, 61.7)	49.5% (L)	(44.9, 54.0)	33.2% (L)	(21.7, 47.2)
Gambling caused health problems, including stress or anxiety*	0.0%	--	11.1%	(8.4, 14.4)	77.3%	(57.8, 89.5)
<b>Mental Health</b>						
Self-reported Mental Health - Excellent or Very Good	76.1%	(75.1, 77.1)	68.6% (L)	(64.4, 72.5)	35.0% (L)	(23.1, 49.2)
Gambled to forget problems or feel better when depressed	1.0%	(0.7, 1.4)	15.1% (H)	(11.8, 19.1)	72.4% (H)	(58.8, 82.7)
Ever considered suicide or taking your own life	8.2%	(7.6, 8.9)	12.8% (H)	(10.0, 16.3)	32.1% <sup>E</sup> (H)	(20.8, 46.0)
<b>Co-dependencies</b>						
Used alcohol or drugs while gambling	‡	--	27.9%	(19.9, 37.7)	33.4% <sup>E</sup>	(21.1, 48.5)
<b>Family Impacts</b>						
Gambling caused financial problems for you or your family*	0.0%	--	6.7%	(4.5, 9.9)	75.2%	(61.0, 85.5)

Notes: (1) Gambling classifications are based on a modified version of the nine-item Problem Gambling Severity Index (PGSI), part of the Canadian Problem Gambling Index (CPGI). (2) 95% Confidence intervals are used on response estimates, which means the estimate is within the range 19 times out of 20. (3) "At least sometimes" is an aggregate of almost always, most of the time and sometimes in the past 12 months. ‡ Question only asked of moderate to problem gamblers. E – Moderately high sampling variability; interpret with caution. F – Very high sampling variability and/or sample size less than 10; data suppressed. H – Significantly higher than non-problem gamblers. L – Significantly lower than non-problem gamblers. Low-risk and Moderate-risk gamblers were combined due to small sample sizes. \*This item is part of the PGSI and was used to classify type of gambler. Given this, we would anticipate significant differences between gambler types; however, these differences are still meaningful and illustrate the level of differentiation in behaviour between problem gamblers and lower risk gamblers.

Data Source: Canadian Community Health Survey, 2007/08. Statistics Canada, Share File, Knowledge Management and Reporting Branch, Ontario Ministry of Health and Long-Term Care.

Prepared by: Toronto Public Health

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## Appendix D: Ontario Organizations Addressing Problem Gambling

### **Centre for Addiction and Mental Health**

The Centre for Addiction and Mental Health (CAMH) is Canada's largest mental health and addiction teaching hospital, as well as one of the world's leading research centres in the area of addiction and mental health. CAMH combines clinical care, research, education, policy development and health promotion to help transform the lives of people affected by mental health and addiction issues. CAMH and the PGIO receive funding from a wide range of funders including: Canadian Institutes of Health Research, CAMH donors and the CAMH Foundation, U.S. National Institutes of Health, Health Canada, the Ontario Ministry of Health and Long-Term Care, Canada Foundation for Innovation, the Ontario Ministry of Economic Development and Innovation, and the Public Health Agency of Canada.

**Problem Gambling Institute of Ontario (PGIO)** at the Centre for Addiction and Mental Health brings treatment professionals and leading researchers together with experts in communicating and sharing knowledge. The PGIO serves as a hub resource by offering CAMH's diverse expertise in mental health and addiction. The focus is on collaboratively developing, modelling and sharing evidence-based solutions to gambling related problems, within Ontario and around the world. (See above for funding sources for CAMH's PGIO.)

### **Responsible Gambling Council**

The Responsible Gambling Council (RGC) is an independent non-profit organization dedicated to problem gambling prevention. RGC creates and delivers awareness and information programs for specific age groups and communities, including adults, parents, youth and young adults, older adults, new Canadians and the aboriginal community. It also promotes the adoption of improved play safeguards through best practices research, standards development and the RG Check accreditation program. The Responsible Gambling Council receives funding for the delivery of its programs, projects and research across Canada. The Ontario government commits two per cent of annual slot revenue from charity casinos and racetracks to the Ministry of Health and Long-Term Care for the research, prevention and treatment of problem gambling. RGC's base funding for the Youth Performances, Know the Score and Newscan in Ontario, along with funding for Problem Gambling Prevention Week and social marketing campaigns, is provided by the Ontario Ministry of Health and Long-Term Care. Funding for the independent operations of the Responsible Gaming Resource Centres is provided by Ontario Lottery and Gaming Corporation. RGC undertakes programs, research and evaluations for other entities across all jurisdictions in Canada, funded on a project basis.

### **Ontario Problem Gambling Research Centre**

Ontario Problem Gambling Research Centre (OPGRC) was created by the Ontario government in 2000, as part of its strategy to prevent and reduce harm from gambling. OPGRC operates at arm's length, with its own charter and Board of Directors. With a four million dollar annual budget funded through the Ministry of Health and Long-Term Care, OPGRC has a provincial mandate to build research capacity, fund research and disseminate findings.



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## **Ontario Problem Gambling Helpline**

The Ontario Problem Gambling Helpline opened in 1997 as a province-wide information and referral service designed to ensure that all communities in Ontario have free, confidential and anonymous access to information about and referral to problem-gambling treatment resources.

It is sponsored by and integrated within the Ontario Drug and Alcohol Registry of Treatment (DART) and utilizes DART'S telephone infrastructure, computer system, call centre workstations and staff. It operates from DART's offices in London, Ontario. DART is a not-for profit agency governed by a Board of Directors.

## **Ontario Lottery and Gaming (OLG)'s Responsible Gaming Resource Centres**

Responsible Gaming Resource Centres have expanded from two locations to all 27 locations in OLG casino and slots venues across Ontario. The centres provide patrons with information about safer gambling practices, assistance and referrals for help, if necessary. The centres are operated and staffed by independent problem gambling prevention specialists from the Responsible Gambling Council, a non-profit organization specializing in prevention strategies. Information provided to the RGRC staff is confidential. OLG provides free space in the venue and funds operating costs.

## **YMCA Youth Gambling Program (YMCA)**

The YMCA is a charitable organization offering personal growth through participation and service to the community. It has developed a program, the Youth Gambling Program (YGP), that is designed to implement prevention and educational strategies for problem gambling among youth in selected communities across Ontario.

CITY OF VAUGHAN

**EXTRACT FROM COUNCIL MEETING MINUTES OF JANUARY 29, 2013**

Item 1, Report No. 4, of the Committee of the Whole (Working Session), which was adopted, as amended, by the Council of the City of Vaughan on January 29, 2013, as follows:

***By receiving the following Communications:***

- C5. Mr. Guido Masutti, dated January 23, 2013;***
- C8. Mr. Frank Greco, dated January 28, 2013; and***
- C11. Ms. Andrea Kuprejanov-Hatzis, dated January 28, 2013.***

**1 ONTARIO LOTTERY AND GAMING CORPORATION (OLG)- ENTERTAINMENT AND CASINO  
COMPLEX ECONOMIC IMPACT REVIEW**

The Committee of the Whole (Working Session) recommends:

- 1) That the recommendation contained in the following report of the Executive Director, dated January 22, 2013, be approved;
- 2) That staff continue to collect information on this subject as may be required by Council to make a decision at a later date regarding whether the City of Vaughan should host an entertainment complex with a casino;
- 3) That the resulting staff report include the development of terms and conditions for such a proposal;
- 4) That the report be submitted to an evening meeting of Committee of the Whole in March, 2013;
- 5) That the following deputations and Communication be received:
  1. Ms. Rossana Burgos, Lady Nadia Drive, Maple;
  2. Mr. Guido Masutti, Riverview Avenue, Woodbridge;
  3. Mr. Paul Gonzalez, Broomlands Drive, Vaughan;
  4. Mr. Mario G. Racco, Checker Court, Thornhill;
  5. Mr. Roger Dickinson, Donhill Crescent, Kleinburg;
  6. Ms. Maureen Lynett, Glenlake Avenue, Toronto;
  7. Ms. Maxine Poverine, Ohr Menachem Way, Thornhill, and Communication C3, dated November 5, 2012, from Mr. Alexander Greer; and
  8. Mr. Kevin Hanit, Queensbridge Drive, Concord; and
- 6) That the following Communications be received:
  - C1 Presentation material, titled "An Integrated Entertainment and Casino Complex in Vaughan", dated January 22, 2013; and
  - C2 Presentation material, titled "OLG Responsible Gambling Strategy: Presentation to the City of Vaughan", dated January 22, 2013.

**Recommendation**

The Executive Director in consultation with the City Manager recommends:

1. THAT the Staff report and presentation be received; and,
2. THAT the presentation by OLG be received; and,
3. THAT Council provide direction to Staff as to next steps in the OLG process.

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### EXTRACT FROM COUNCIL MEETING MINUTES OF JANUARY 29, 2013

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##### **Contribution to Sustainability**

Green Directions Vaughan embraces a *Sustainability First* principle and states that sustainability means we make decisions and take actions that ensure a healthy environment, vibrant communities and economic vitality for current and future generations.

The City's New Official Plan 2010 clearly articulates that one of the City's principles that support the long-term vision of the Vaughan Metropolitan Centre (VMC) is that the downtown will be a model of sustainable development. To that end, Vaughan Holding's Inc. has developed plans for a District Energy System to service the VMC. The integrated entertainment and casino complex project with hotel, performance venue, convention space, restaurant, retail and mixed use would be an ideally suited project to be a significant catalyst and customer of the newly developed District Energy system.

##### **Economic Impact**

A permanent facility could provide significant benefits to Vaughan including additional revenue, new jobs, capital investment and property taxes. The OLG has communicated to staff that an integrated entertainment and casino complex in Vaughan with an anticipated capital investment of \$1.0 - \$1.5B by a private sector gaming operator would:

- Generate an OLG hosting fee of \$20 to \$25 Million per year
- Produce approximately \$16.3 to \$24.5 Million in property taxes
- Create 8,000 – 10,000 direct permanent jobs
- Create 3,000 construction jobs

##### **Communications Plan**

Staff will continue working with the OLG to communicate to Council information regarding the OLG modernization process. If the City moves forward in the OLG Modernization process and identifies through a Council resolution that defines the terms and conditions under which Vaughan would consider being a host municipality, Staff will create a formal communications plan.

##### **Purpose**

As per Item 2, Report No. 42 of the Committee Of The Whole Working Session (October 23, 2012) this report provides Council with an update of the economic impacts of an OLG facility using analysis undertaken in the City of Toronto.

##### **Background - Analysis and Options**

As part of the Ontario Government's new direction to OLG in July of 2010, OLG was asked to complete a comprehensive strategic review of the lottery distribution network and land-based gaming facilities. The result of the review was an OLG report to government on March 12, 2012 titled, *Modernizing Lottery and Gaming in Ontario: Advice To Government*.

The report concluded that by 2017-18, OLG will be: A modern, sustainable organization, which will increase net profit to the Province by an additional \$1.3 billion annually – all while upholding responsible gambling standards.

The report identified where and how gaming will be offered in the province across all types of games and all channels through the creation of geographic areas called, "Gaming Zones".

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**Gaming Zones**

OLG has identified 29 gaming zones where existing or new gaming facilities would be permitted following municipal and other approvals. OLG originally based the zones on a business model that is designed to maximize revenue and create value for the province. Factors such as proximity of a gaming location to other gaming facilities and residential areas were measured to determine the zones.

The zones for the location of OLG gaming facilities are being further refined by OLG. The geographic areas may be adjusted based on ongoing discussions with relevant stakeholders, information received, and through the OLG procurement process. A portion of Vaughan was originally identified as part of a gaming zone which also includes the current OLG site, Woodbine Racetrack and Slots.

**OLG's Procurement Process for Modernization**

On May 17, 2012, OLG announced a new competitive and transparent procurement process to seek input from potential vendors as it expands regulated private-sector gaming in Ontario. The multi-stage process includes:

- *Request for Information (RFI)* – (Now underway) allows the OLG to gather valuable information from potential regulated vendors and help determine the range of options available in the market and assess potential vendor interest, as well as risks. The RFI was issued on May 17, 2012 and closes on July 4, 2012. The RFI is published on MERX tendering system ([www.merx.com](http://www.merx.com)). The RFI will be followed by and RFP in the fall of 2012.
- *Request for Pre-Qualification (RFPQ)* – (potential release summer 2012) gives vendors interested in the RFP an opportunity to submit information on their financial and technical capabilities. OLG will then select pre-qualified vendors.
- *Request for Proposal (RFP)* – (potential release fall 2012) gives the selected vendors the opportunity to bid on specific products and/or services within the gaming business, and identify sites. Once the bidding process is complete, OLG will select vendors to become the regulated private sector providers for gaming and lottery gaming sites.

**OLG has confirmed that the RFPQ and RFP process to select a private operator for a GTA integrated casino and entertainment gaming facility will begin in April, 2013 and likely run until late 2013. OLG will focus the RFP process only with municipalities which are interested in hosting a facility.**

**Significant Entertainment and Tourist Potential for Vaughan**

The City's Economic Development Strategy states that in order to support the City as a destination, there are opportunities for enhancement of the existing entertainment amenities that are currently found in the area. Overall, there are a number of creative and cultural industry strengths disbursed across the city, making it difficult for residents and tourists to package these amenities into coordinated "Vaughan experiences". By creating stronger virtual and physical connections, a hub and spoke concept, radiating out from a central location, the city can enhance the overall quality of its cultural and tourism industries.

Therefore, the private sector (through the OLG RFP process) could fund and build an entertainment district anchored by a gaming facility in an appropriate area in Vaughan, such as the Vaughan Metropolitan Centre, and bring benefits that support the City's economic development strategy, and be a catalyst for arts, culture and tourism development such as;



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- Build a performing arts/concert styled venue(s).
- A convention facility with the ability to host international-sized conventions.
- Create annual revenue to the municipality from gaming proceeds.
- Anchor a Forbes Five Star rated accommodation(s).
- Generate large scale direct and indirect job creation.

The private sector infrastructure investment is expected to be realized in the next five years to achieve the desired goals of the OLG modernization process.

#### **Research and Information Overview**

Per Council direction, staff has researched and gathered further information from a number of sources as they relate to the economic impact of an integrated entertainment complex with a casino if located in the City of Toronto. These sources include;

- Meetings with OLG Representatives
- City of Toronto Staff Reports
- Independent Consultancy Reports
- Media Articles; and
- OLG Modernization Documents

#### **The Economic Impact Of Locating An OLG Integrated Casino Complex In Toronto**

The City of Toronto commissioned an economic impact analysis by Ernst and Young, titled "*Potential Commercial Casino in Toronto*" dated October 26, 2012 to "determine the potential financial and economic impacts of a casino operation in order to assist the City in its decision making process." (Source: Commercial Casino Study in Toronto Study, p. 5)

The full report in addition to the financial and economic impact gave an overview of gambling in Ontario and Toronto, identified potential locations for a casino complex in Toronto, the social impacts of a casino in Toronto and public consultation process.

From an economic impact analysis, the report identified that a casino located in an integrated entertainment complex could potentially generate \$35 to \$250MM in an one time land sale, generate annual property taxes of \$22 to \$30MM in addition to an annual OLG hosting fee in the range of \$17 to \$168MM.

Since the release of the Ernst and Young Report, Staff in Toronto used that report and further research and information from the OLG to complete the following economic impact summary:

<b>Port Lands, Exhibition Place or Downtown</b>	<b>During Construction (3-4 year timeframe)</b>	<b>In Operation</b>
Integrated Entertainment Complex with a Casino	\$1.9 - \$2.4B in construction expenditures  6,800 – 8,500 jobs	Increased economic activity of \$640MM/year  Hosting fee \$50-\$100MM  5,800 – 7,300 jobs
Standalone Casino	\$0.8 - \$1.1B in construction expenditures  2,900 to 3,800 jobs	Increased economic activity of \$315MM/year  Hosting fee \$50-\$100MM  2,700 – 3,600

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The City of Toronto also identified that “with any new development, the City could generate additional property taxes. If a new casino is established in Toronto, annual tax revenue is estimated to range from \$10 million to \$27 million depending on the development and the location. A new casino could also realize land sale or lease revenue if it is situated on City-owned lands.

A number of critical variables including the site, scale of the development, commercial terms with the operator and the rules governing operations will affect the development opportunity, and the expected gaming revenues which would in turn impact the value of the hosting fee.

The City of Toronto and OLG are concentrating their discussions on an appropriate funding model for a new integrated entertainment complex facility at the downtown, Port Lands and Exhibition Place locations. According to the OLG the annual hosting fee for an integrated, destination gaming and entertainment facility located in the downtown/waterfront area of Toronto would be in the \$50 to \$100MM range.” (Source: City of Toronto: Casino Consultation Website )

It should also be noted that the direct hosting fee has no restrictions placed on it by the OLG, therefore, all hosting fee revenue can be used by the host municipality as they choose.

**The Economic Impact of Locating an OLG Integrated Casino Complex In Vaughan**

A permanent facility could provide significant benefits to Vaughan including additional direct revenue, create new jobs, capital investment and additional property taxes. Following multiple staff meetings with representatives of the OLG, an integrated entertainment complex with a casino could generate;

- An Annual OLG hosting fees of \$20 to \$25 Million
- Property Taxes that range from \$16.3 to 24.5 Million\*
- Approximately 8,000-10,000 direct jobs
- Approximately 4,000 indirect jobs
- Approximately 3,000 construction jobs (three to four year period)
- Capital Investment of \$1.0 to \$1.5B
- Strengthen tourism market
- Be a catalyst for other development

Noting the above, the annual OLG hosting fee directly to the City of Vaughan could be \$20 to 25 Million if a permanent Integrated Entertainment and Casino complex was located within the City. These funds could be used by the City at its own discretion.

The OLG estimates that 60 percent of total jobs at the facility will be related to gaming, with 20 percent in management and supervisory roles (avg. compensation \$60 - \$100,000) and the remaining 80 percent in floor staff (avg. compensation \$40 - \$60,000).

In addition to a permanent facility, OLG has also made Staff aware that it has plans to have a phased approach while the permanent site is completed. OLG provided the following information about a “Phase 1” site if it was located in Vaughan:

- Annual OLG hosting fees of \$10-\$15MM (two to three year period)
- 2,000 Direct jobs
- Approximately 500 construction jobs (six to 12 months)
- Capital Investment of \$200MM
- Increased property taxes

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**\*Property Taxes** have been calculated using 2012 Tax Information and a projected capital investment of \$1.0 to \$1.5B. A discount of 15% was applied for MPAC purposes based on discussions with OLG.

#### Proportion of Taxes \$1.0B

City:	\$2.4MM
Region:	\$4.3MM
Education:	\$9.6MM
<b>TOTAL:</b>	<b>\$16.3MM</b>

#### Proportion of Taxes \$1.5B

City:	\$3.7MM
Region:	\$6.4MM
Education:	\$14.4MM
<b>TOTAL:</b>	<b>\$24.5MM</b>

#### **Impact of an Integrated Entertainment and Casino Complex on Residential Development**

The opportunity for Vaughan to be the site of an entertainment and casino district located in an appropriate area of the City such as the Vaughan Metropolitan Centre has potential to be a catalyst for development of the City's new downtown.

Staff requested OLG to provide input on the impact of a casino on residential development. OLG provided information on the following case studies which staff is further reviewing;

- *The Crown Melbourne* (Melbourne, Australia): Located approximately 0.2-0.5 km away from two residential high-rise developments: Eureka Tower (550 condos) and Melbourne Tower. The casino and entertainment complex preceded the development of these two residential towers.
- *Marina Bay Sands* (Singapore, Singapore): Located approximately 1 km from two condo developments: Sail @ Marina Bay (1,110 condos) and Marina Bay Residences (425 condos). Both towers were built within 1-2 years of the casino / entertainment complex opening.
- *Gran Casino De Barcelona* (Barcelona, Spain): Located approximately 0.3 km away from residential complexes. Mainly apartment buildings (10 floors in height) with small shops beneath.
- *Other European examples*: There are many major casinos in London, England and Paris, France that are located within 1 km of residential areas.
- Many other North American examples of casinos co-located with residential including; Vancouver, Calgary, Edmonton, Cleveland, and Pittsburgh.
- A reputable Toronto based developer has proposed a plan that includes integration of gaming, entertainment, office, and residential buildings.

The concept of an "Entertainment Complex" without a Casino that is comprising uses such as; a conference centre, hotel, performing arts centre, retail and office have been contemplated in two locations in the City through the City's New Official Plan 2010- Highway 427 & 7 and the Vaughan Metropolitan Centre. If either of these locations is deemed appropriate for an integrated casino and entertainment complex, the City will have full planning authority as with any construction project. Including the urban design requirements that will be paramount to the integration of the built form into the fabric of the City.

#### **Provincial Public Consultation Process**

The public consultation process can take many forms in Ontario. The Ontario Lottery and Gaming Corporation Act had required that municipalities hold a referendum in regard to being a site for a

## CITY OF VAUGHAN

### EXTRACT FROM COUNCIL MEETING MINUTES OF JANUARY 29, 2013

#### Item 1, CW(WS) Report No. 4 – Page 7

casino. However, on June 1, 2012 the Province replaced this regulation (347/00) with regulation that provided greater flexibility for the municipality to undertake public consultation.

The new regulation (81/12) refers to seeking public input into the establishment of a gaming site but does not set out specific methods or quantity of public consultation that must be undertaken.

The following is an excerpt from Regulation 81/12 subsection 2(3) for a proposed gaming site to be established in a municipality:

- The Municipal Council or the council of the band, as the case may be, seeks public input in to the establishment of the proposed gaming site and gives the Corporation, in writing, a description of the steps it took to do and a summary of the public input it received, and
- The municipal council or the council of the band, as the case may be, passes a resolution supporting the establishment of the gaming site in the municipality or on the band's reserve and gives a copy of the resolution to the Corporation.

#### **Vaughan's Consultation Process**

As reported to Council at Committee of the Whole Working Session on October 23, 2012, Staff undertook a research initiative that engaged the Vaughan Community as it relates to the OLG's expansion of gaming in Ontario and the opportunity of siting a large-scaled entertainment and casino complex in the Greater Toronto Area.

To that end, the following objectives were set:

- Assess residents' general attitudes toward casinos;
- Determine citizens views as pros and cons of having a casino in the GTA and specifically in the City of Vaughan; and
- Understand attitudes toward trade-offs between potential economic benefits and social issues associated with a casino.

Given the nature of the subject matter, staff recognized that it was important to use more than one type of research method to better understand residents' views. Therefore, three different methods were adopted to meet the objectives: focus groups, on-line survey and an information session.

The residents' views on Vaughan being the site for the OLG's entertainment and casino complex, either positive or negative, confirmed that the City had a fiscal responsibility to investigate all aspects related to the economic impact of an entertainment and casino complex in the City.

#### **Potential Social Impacts**

During the consultation process in Vaughan, residents expressed a strong need about the City's obligation to assess the social impact of such a development in Vaughan – also, the consultation process identified that women and families with children are somewhat more concerned that a casino may compromise the safety of the community, and they are likely to seek more assurance from the City on this front.

A report was prepared by Toronto Public Health in consultation with the Centre for Addiction and Mental Health, Problem Gambling Institute of Ontario, titled; *The Health Impacts of Gambling Expansion in Toronto – Technical Report*, November 2012 (ATTACHMENT 2) in response to OLG's Modernizing Lottery and Gaming in Ontario: Strategic Business Review (March 2012).



## CITY OF VAUGHAN

### EXTRACT FROM COUNCIL MEETING MINUTES OF JANUARY 29, 2013

#### Item 1, CW(W.S) Report No. 4 – Page 8

The report states that gambling has been identified as an issue by the public health community in Canada and internationally since the 1990's. Furthermore, the report identifies that "available evidence indicates that the prevalence of problem gambling increases with access to gambling, including proximity to casinos.

A casino located anywhere in the GTA will likely result in increased health risks from problem gambling, with a greater effect on closer communities compared to those further away. All potential sites in the GTA have vulnerable populations nearby. Therefore, any expansion in gambling access in the GTA over and above current levels will likely increase problem gambling rates and the associated health risks in Toronto and nearby communities."

Although the report was prepared for the City of Toronto, the Toronto Public Health Report proposes through a position statement on gambling and health a set of recommendations in the broader context of gambling expansion in Ontario. The position statement recommends that to address the negative impacts on health, all gambling should be regulated and operated so as to minimize health impacts by:

1. Limiting hours of casino operation: no 24-hour access to venues, closed at least six hours per day;
2. Restricting the number of electronic gaming machines (EGMs) and slowing down machine speed of play and features that promote false beliefs of the odds of winning;
3. Eliminating casino loyalty programs;
4. Prohibiting ATMs on the gambling floor;
5. Prohibiting casino credit and holding accounts;
6. Reducing maximum bet size;
7. Mandating a daily loss maximum;
8. Implementing strong casino self-exclusion programs, including a mandatory player card system;
9. Issuing monthly individual patron statements which include full membership medians and averages to compare against personal record of loss, frequency and duration of play.
10. Designating areas for alcohol purchase and not providing alcohol service on casino floors to reduce impaired judgment.

The Toronto Public Health report concludes that "While there are many interventions available for problem gambling, much remains unknown about how to treat problem gambling. Only a minority of problem gamblers (one to two percent per year) seeks or receives treatment.

Furthermore, there is limited evidence on the effectiveness of interventions to prevent problem gambling. There is currently a need for better evidence on how to effectively mitigate the negative health and social impacts of problem gambling and a need for ongoing and rigorous monitoring and evaluation of the health, social and economic impacts of casinos."

#### **Safety For Vaughan Residents**

In preparing this report, staff met with York Regional Police to understand the implications on York Regional Police if a casino was to locate in Vaughan, possibly in the Vaughan Metropolitan Centre (VMC). At the meeting York Regional Police indicated that they don't anticipate an increase in crime as a result of a casino other than what would be expected to result for many new large developments and/or influx of people.

Therefore, if a casino is to open in York Region, attracting more visitors and tourists to the area may result in increased workload pressures.

## **CITY OF VAUGHAN**

### **EXTRACT FROM COUNCIL MEETING MINUTES OF JANUARY 29, 2013**

#### **Item 1, CW(WS) Report No. 4 – Page 9**

##### **OLG Decision Process**

The OLG is seeking from Vaughan Council a declaration of its interest in being a host municipality for an integrated entertainment and casino complex to continue in the OLG RFPQ and RFP process. The OLG process requires that Vaughan Council formally pass a resolution to that effect. The resolution could additionally contain specific terms and conditions that Vaughan would see as necessary to being a host municipality.

The OLG will choose a preferred operator in late 2013. If the preferred gaming operator has a site in Vaughan, then the City will begin the planning application process with OLG and the gaming operator.

##### **Regional Implications**

The OLG anticipates an investment of \$1.0 to \$1.5B in capital investment by the preferred gaming operator if the casino located in Vaughan. This would generate approximately \$4.3 to \$6.4 Million dollars in property tax for the Region. In addition, Staff have highlighted in the report that York Regional Police have noted that attracting more visitors and tourists to the area may result in increased workload.

##### **Conclusion**

As the City continues to position itself as the gateway of economic activity to the Greater Toronto Area this opportunity may accelerate its city building process and strengthen its arts, culture and economic base. This advantageous competitive position will significantly contribute to Vaughan being the key economic development driver of the GTA over the next twenty years, and suggest that Vaughan will increasingly be the gateway for goods, business, people and investment travelling to and from the GTA.

OLG has confirmed that an entertainment/gaming complex will be built in the GTA. If built outside Toronto the entertainment complex will be based on a capital investment in the range of \$1 to \$1.5 billion when complete. A facility of that scope and scale is expected to generate \$20 to \$25 million dollars annually in direct revenue to the host municipality and \$16.3 to \$24.5 Million in property tax. In addition, the City could anticipate an additional 8,000 to 10,000 new jobs and more than 3,000 construction jobs during the three to four years of construction.

Given that OLG has made the decision to locate an entertainment/gaming complex in the GTA the primary issue for Council is to weigh the relative financial, economic and other benefits of having the facility located within the City of Vaughan versus a neighbouring municipality.

##### **Attachments**

Attachment 1 – OLG Presentation

Attachment 2 – Toronto Public Health Report

##### **Report prepared by:**

Tim Simmonds, Executive Director, Office of the City Manager

(A copy of the attachments referred to in the foregoing have been forwarded to each Member of Council and a copy thereof is also on file in the office of the City Clerk.)

## CITY OF VAUGHAN

### EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 23, 2018

Item 23, Report No. 18, of the Committee of the Whole, which was adopted, as amended, by the Council of the City of Vaughan on May 23, 2018, as follows:

***By approving the following:***

- 1) ***That the recommendation contained in the following resolution be approved:***

***Whereas, an application to develop a portion of the Board of Trade Golf Course lands has been withdrawn but is expected to be re-submitted at some future as yet unspecified date; and***

***Whereas, local residents are concerned that trees other than those identified as hazardous to the public may be removed from the site while the application is in abeyance and prior to the completion of the current consultation with golf course and nursery operators as to whether trees on such sites should be covered by the Private Property Tree Protection By-law;***

***It is therefore recommended:***

1. ***That appropriate staff be directed to request the owners of the Board of Trade Golf Course to formally agree in writing to abide by the provisions of the Private Property Tree Protection By-law as a gesture of good faith toward neighbouring residents, and to do so until such time as the consultations referenced above is concluded and Council takes what action it deems appropriate in light of said consultations; and***
2. ***That failing agreement with the above, that appropriate staff be directed to bring forward no later than the Committee of the Whole meeting of June 5, 2018, a site-specific by-law that subjects the said lands to the provisions of the Private Property Tree Protection By-law, until such time as the consultations referenced above is concluded and Council takes what action it deems appropriate in light of said consultations.***

~~\*2) That recommendation 1. contained in the resolution provided by Councillor Carella dated May 8, 2018, be replaced with the following amended recommendation:~~

- ~~1. That staff be directed to undertake such studies, which may include, subject to an appropriate funding source being identified and consistency with the Official Plan, a cultural heritage landscape evaluation, an environmental impact study, an economic analysis, a comprehensive land use analysis, health impact analysis, and a~~

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\* Amended at the Council meeting of June 19, 2018 under Minute No. 92.

## CITY OF VAUGHAN

### EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 23, 2018

Item 23, CW Report No. 18 – Page 2

~~\*community impact assessment, and retain such consultants as are necessary to address the above City-wide land use planning concerns and prepare any recommended amendments to the City's land use planning policies in respect of infill developments; and~~

3) *That the following communications be received:*

C3 *Mr. David Donnelly, Donnelly Law, Carlaw Avenue, Toronto, dated May 8, 2018;*

C11 *Mr. David Donnelly, Donnelly Law, Carlaw Avenue, Toronto, dated May 11, 2018;*

C15 *Mr. Mark Yarranton, KLM Planning Partners Inc., Jardin Drive, Concord, dated May 22, 2018;*

C16 *Dr. Laura Vecchiarelli-Federico, Keep Vaughan Green, dated May 22, 2018; and*

C19 *Keep Vaughan Green Board of Director, dated May 23, 2018.*

#### 23 COMMUNITY IMPACT REVIEW OF BOARD OF TRADE GOLF COURSE DEVELOPMENT PROPOSAL

The Committee of the Whole recommends:

- 1) That recommendations 1 and 3 contained in the following resolution provided by Councillor Carella dated May 8, 2018, be approved:

*Whereas, applications to develop large parcels of infill lands across the City of Vaughan may have adverse effects on the public interest, a review of City planning policies in light of the potential for such large-scale projects is in order; and*

*Whereas, policies in the Vaughan Official Plan 2010 (VOP 2010) regarding large-scale infill in existing community areas do not contemplate large scale infill projects, a review of policies to determine whether amendments should be made to address such proposals in future, in order to have the appropriate policy context in place to properly consider such applications; and*

*Whereas, applications that constitute large-scale infill within any well-established and stable residential community may be defined, as is typical in Vaughan, by valley-tableland settings and open spaces, which may be appropriate for designation as a cultural heritage landscape with resulting amendments to the VOP 2010; and*

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\* Amended at the Council meeting of June 19, 2018 under Minute No. 92.

## CITY OF VAUGHAN

### EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 23, 2018

Item 23, CW Report No. 18 – Page 3

**Whereas, greater consideration of the impact of large-scale infill developments on natural heritage systems and features is required to determine whether the current VOP 2010 policies should be amended to address the implications of large-scale infill development adjacent to natural heritage systems; and**

**Whereas, it is a matter of provincial interest that land use planning policies and decisions advance the orderly development of safe and healthy communities in every part of Vaughan, and therefore potential impacts of any large-scale infill development on existing community health, well-being and safety should be considered; and**

**Whereas, deputants heard on this matter today have identified other significant issues, such as, first nations imprints, conservation stewardship, mental health impacts, that deserve consideration for further studies; and**

**Whereas, a review of large infill projects as constituted herein merits the broadest possible title, such that what is described above, shall be designated the community impact review.**

**\*It is therefore recommended:**

- ~~1. That staff be directed to undertake such studies and retain such consultants as are necessary to address the above City-wide land use planning concerns and prepare any recommended amendments to the City's land use planning policies in respect of infill developments; and~~
- ~~3. That the necessary funding source be identified.~~
- ~~\*2) That should an application for these lands be submitted before the studies are completed, staff immediately report to Council;~~
- 3) That the confidential recommendation of the Committee of the Whole (Closed Session) meeting of May 8, 2018, be approved;
- 4) That the member's resolution submitted by Councillor Carella, dated May 8, 2018, be received;
- 5) That the following Deputations and Communications be received:
  1. Mr. Richard Lorello, Treelawn Boulevard, Kleinburg;
  2. Ms. Josie Fedele, West Woodbridge Homeowners Association Inc., Albany Drive, Woodbridge;

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\* Amended at the Council meeting of June 19, 2018 under Minute No. 92.



## **CITY OF VAUGHAN**

### **EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 23, 2018**

Item 23, CW Report No. 18 – Page 4

3. Mr. Tony Lorini, Greater Woodbridge Ratepayers Association, Ayton Crescent, Woodbridge;
  4. Dr. Laura Federico, Keep Vaughan Green, Waymar Heights Boulevard, Woodbridge;
  5. Ms. Daniela Costantini, Keep Vaughan Green, Kilmuir Gate, Woodbridge;
  6. Mr. Andre Willi, Keep Vaughan Green, Ampezzo Avenue, Vaughan;
  7. Ms. Paola Crocetti, Keep Vaughan Green, Kilmuir Gate, Woodbridge;
  8. Mr. Jamie Maynard, Woodbridge Village Ratepayers Association, William Street, Woodbridge;
  9. Mr. Hatem Abouelnile, Keep Vaughan Green, Kilmuir Gate, Vaughan;
  10. Ms. Pina Sacco, Village of Woodbridge Ratepayers Association, Amos Maynard Circle, Woodbridge;
  11. Mr. Furio Liberatore, Princess Isabella Court, Maple;
  12. Mr. Nick Pinto, West Woodbridge Homeowners Association Inc., Mapes Avenue, Woodbridge; C12, deputation material, and C13 Petition, both submitted at the meeting;
  13. Mr. David Donnelly, Donnelly Law LLP, Keep Vaughan Green, Carlaw Avenue, Toronto, and Communication C9, dated May 8, 2018;
  14. Mr. Bob Moroz, Keep Vaughan Green, Kilmuir Gate, Vaughan;
  15. Mr. Adriano Volpentesta, America Avenue, Maple;
  16. Mr. Mario Dinardo, Appian Way, Woodbridge; and
  17. Ms. Michaela Barbieri, Campania Court, Vaughan; and
- 6) That the following Communications be received:
- C1. Presidents of Keep Vaughan Green, Village of Woodbridge Ratepayers Association and West Woodbridge Homeowners Association, dated April 18, 2018;
  - C2. Memorandum from the Deputy City Manager, Planning

## CITY OF VAUGHAN

### EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 23, 2018

Item 23, CW Report No. 18 – Page 5

and Growth Management, Director of Development Planning and City Solicitor, dated April 27, 2018;

- C3. Steven Del Duca, MPP Vaughan, Rutherford Road, Woodbridge, dated May 1, 2018;
- C6. Confidential Memorandum from the City Solicitor, dated May 7, 2018; and
- C10. Memorandum from the Director of Development Planning, dated May 8, 2018.

#### Member's Resolution

Submitted by Councillor Tony Carella

**Whereas**, Clubhouse Properties Inc. has submitted to the City of Vaughan a proposal to amend the Vaughan Official Plan 2010 with respect to the property known municipally as 20 Lloyd Street (the Board of Trade Golf Course), to re-designate portions of the lands from "Private Open Space" to "Low Rise Residential", "Infrastructure and Utilities", "Parks", and "Natural Areas", to permit a (1) low-rise residential development (of approximately 660 units on 100 acres, or an average of 6.6 units per acre); (2) continued operation of a golf course and associated uses, and (3) public parks; and

**Whereas**, the proposal is located in an area where the surrounding lands have featured low-rise residential units for upwards of thirty-five years and more; and

**Whereas**, there has been significant community concern expressed identifying potential impacts of a development of this size and scope on the existing stable residential fabric of the community;

**Whereas**, the development review process provides for community input and response; and

**Whereas**, the application is in the early stage of review;

#### ***It is therefore recommended:***

- 1. That staff provide a preliminary report on the status of the application and the reports submitted in support of the application;
- 2. That the preliminary report identify the community concerns and whether they have been considered in the reports submitted in support of the application;
- 3. That staff identify any community concerns that have not been addressed and that these concerns be referred to the applicant for comment and response;

## **CITY OF VAUGHAN**

### **EXTRACT FROM COUNCIL MEETING MINUTES OF MAY 23, 2018**

#### **Item 23, CW Report No. 18 – Page 6**

4. That peer reviews coordinated by the City be undertaken in accordance with Section 10.1.3.5 of Vaughan Official Plan 2010, where necessary, to assist in the analysis of the studies submitted in support of the application, at the expense of the applicant;
5. That based on the outcome of the staff and agency and peer review process along with input from the public, the City initiate a Community Impact Review prepared by a party or parties qualified to do so, in accordance with a scope of work to the satisfaction of the Deputy City Manager Planning and Growth Management; and that Council allocate the necessary budget based on the approved scope of work;
6. That the Review focus on issues related to soft services such as community facilities, potential impacts on quality of life and the means of achieving a compatible integration of the new and old development;
7. That the Review will not specifically address hard services (water, sewers and stormwater management) and traffic and transportation as they will be considered in other required reports. However, such matters may be considered as inputs where they play a role affecting community amenity and quality of life;
8. That the party or parties charged with conducting the Review will solicit, receive, and consider any and all information, comments, and concerns as provided in writing by anyone having an interest in this matter, such communications to be conveyed to those conducting the study (1) by surface mail or courier to the attention of the City of Vaughan Development Planning Department, 2141 Major Mackenzie Drive, Vaughan ON L6T 1A1 or (2) by electronic mail to [developmentplanning@vaughan.ca](mailto:developmentplanning@vaughan.ca) and in either case marked "Re: Board of Trade Development "Community Impact Review" no later than a date as may be specified by the Development Planning Department; and
9. That the results of the Review be incorporated into the Development Planning Department's technical report on this and any other applications

## MEMBER'S RESOLUTION

**Meeting/Date:** COMMITTEE OF THE WHOLE – MAY 8, 2018

**Title:** COMMUNITY IMPACT REVIEW OF BOARD OF TRADE GOLF COURSE DEVELOPMENT PROPOSAL

**Submitted by:** Councillor Tony Carella

**Whereas**, Clubhouse Properties Inc. has submitted to the City of Vaughan a proposal to amend the Vaughan Official Plan 2010 with respect to the property known municipally as 20 Lloyd Street (the Board of Trade Golf Course), to re-designate portions of the lands from "Private Open Space" to "Low Rise Residential", "Infrastructure and Utilities", "Parks", and "Natural Areas", to permit a (1) low-rise residential development (of approximately 660 units on 100 acres, or an average of 6.6 units per acre); (2) continued operation of a golf course and associated uses, and (3) public parks; and

**Whereas**, the proposal is located in an area where the surrounding lands have featured low-rise residential units for upwards of thirty-five years and more; and

**Whereas**, there has been significant community concern expressed identifying potential impacts of a development of this size and scope on the existing stable residential fabric of the community;

**Whereas**, the development review process provides for community input and response; and

**Whereas**, the application is in the early stage of review;

***It is therefore recommended:***

1. That staff provide a preliminary report on the status of the application and the reports submitted in support of the application;
2. That the preliminary report identify the community concerns and whether they have been considered in the reports submitted in support of the application;
3. That staff identify any community concerns that have not been addressed and that these concerns be referred to the applicant for comment and response;

4. That peer reviews coordinated by the City be undertaken in accordance with Section 10.1.3.5 of Vaughan Official Plan 2010, where necessary, to assist in the analysis of the studies submitted in support of the application, at the expense of the applicant;
5. That based on the outcome of the staff and agency and peer review process along with input from the public, the City initiate a Community Impact Review prepared by a party or parties qualified to do so, in accordance with a scope of work to the satisfaction of the Deputy City Manager Planning and Growth Management; and that Council allocate the necessary budget based on the approved scope of work;
6. That the Review focus on issues related to soft services such as community facilities, potential impacts on quality of life and the means of achieving a compatible integration of the new and old development;
7. That the Review will not specifically address hard services (water, sewers and stormwater management) and traffic and transportation as they will be considered in other required reports. However, such matters may be considered as inputs where they play a role affecting community amenity and quality of life;
8. That the party or parties charged with conducting the Review will solicit, receive, and consider any and all information, comments, and concerns as provided in writing by anyone having an interest in this matter, such communications to be conveyed to those conducting the study (1) by surface mail or courier to the attention of the City of Vaughan Development Planning Department, 2141 Major Mackenzie Drive, Vaughan ON L6T 1A1 or (2) by electronic mail to [developmentplanning@vaughan.ca](mailto:developmentplanning@vaughan.ca) and in either case marked "Re: Board of Trade Development "Community Impact Review" no later than a date as may be specified by the Development Planning Department; and
9. That the results of the Review be incorporated into the Development Planning Department's technical report on this and any other applications made with respect to proposed development of the subject lands.

Respectfully submitted,

Tony Carella, FRSA  
Councillor, Ward 2/Woodbridge West



**CITY OF VAUGHAN  
COUNCIL MINUTES  
JUNE 19, 2018**

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**CITY OF VAUGHAN**

**COUNCIL MEETING**

**TUESDAY, JUNE 19, 2018**

**MINUTES**

**1:00 P.M.**

Council convened in the Municipal Council Chamber in Vaughan, Ontario, at 1:14 p.m.

The following members were present:

Hon. Maurizio Bevilacqua, Mayor  
Regional Councillor Mario Ferri  
Regional Councillor Gino Rosati  
Regional Councillor Sunder Singh  
Councillor Tony Carella  
Councillor Rosanna DeFrancesca  
Councillor Marilyn Iafrate  
Councillor Alan Shefman  
Councillor Sandra Yeung Racco

**85. CONFIRMATION OF AGENDA**

MOVED by Councillor Yeung Racco  
seconded by Regional Councillor Ferri

THAT the agenda be confirmed.

**AMENDMENT**

MOVED by Regional Councillor Rosati  
Seconded by Regional Councillor Singh

That the following addendums be added to the agenda:

1. **PROCLAMATION AND FLAG RAISING REQUEST ISLAMIC HERITAGE MONTH**

Report of the City Clerk with respect to the above.

CARRIED UNANIMOUSLY

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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Upon the question of the main motion:

CARRIED AS AMENDED

### **86. DISCLOSURE OF INTEREST**

Councillor Carella declared an interest with respect to Item 1, Special Committee of the Whole Report No. 25, INTEGRITY COMMISSIONER CODE OF CONDUCT COMPLAINT INVESTIGATION REPORT #052818(F) IN RESPECT OF COUNCILLOR TONY CARELLA, he is the subject of the investigation.

### **87. CEREMONIAL PRESENTATIONS**

The City of Vaughan was awarded the ClimateWise Business Network Award.

### **88. ADOPTION OR CORRECTION OF MINUTES**

MOVED by Regional Councillor Singh  
seconded by Councillor Ferri

THAT the minutes of the meeting of May 23, 2018 and Special Council meeting of June 8, 2018 be adopted as presented.

CARRIED

Refer to Minute No. 92 for further disposition regarding this matter.

### **89. COMMUNICATIONS**

MOVED by Regional Councillor Ferri  
seconded by Councillor DeFrancesca

THAT Communications C1 to C14 inclusive be received and referred to their respective items on the agenda.

CARRIED

### **90. DETERMINATION OF ITEMS REQUIRING SEPARATE DISCUSSION**

The following items were identified for separate discussion:

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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### Committee of the Whole Report No. 21

Items 24, 31, 33, 35, 40, 42 and 48

### Committee of the Whole (Public Hearing) Report No. 22

Item 4

### Committee of the Whole (Closed Session) Report No. 24

Items 6 and 7

### Special Committee of the Whole Report No. 25

Item 1

### Addendum Items

Item 1

MOVED by Councillor Yeung Racco  
seconded by Councillor Iafrate

THAT Items 1 to 54 of the Committee of the Whole Report No. 21, with the exception of the items identified for separate discussion, BE APPROVED and the recommendations therein be adopted;

THAT Items 1 to 5 of the Committee of the Whole (Public Hearing) Report No. 22, with the exception of the item identified for separate discussion, BE APPROVED and the recommendations therein be adopted;

THAT Items 1 to 23 of the Finance, Administration and Audit Committee Report No. 6, BE APPROVED and the recommendations therein be adopted;

THAT Items 1 to 3 of the Committee of the Whole (Working Session) Report No. 24, BE APPROVED and the recommendations therein be adopted; and

THAT Items 1 to 8 of the Committee of the Whole (Closed Session) Report No. 25, with the exception of the items identified for separate discussion, BE APPROVED and the recommendations therein be adopted.

CARRIED

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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### **91. CONSIDERATION OF ITEMS REQUIRING SEPARATE DISCUSSION**

#### **COMMITTEE OF THE WHOLE REPORT NO. 21**

(Refer to Committee Report for complete recommendations and documentation on all Committee items.)

ITEM - 35 OFFICIAL PLAN AMENDMENT FILE OP.17.010 ZONING BY-LAW AMENDMENT FILE Z.17.026 DRAFT PLAN OF SUBDIVISION FILE 19T-17V009 TESTON SANDS INC. VICINITY OF DUFFERIN STREET AND TESTON ROAD

MOVED by Councillor Iafrate  
seconded by Councillor DeFrancesca

THAT Item 35, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the following in accordance with communication C9, from the City Solicitor and the Deputy City Manager, Planning and Growth Management, dated June 18, 2018:

That the following recommendations replace the recommendations contained in Committee of the Whole, Report No. 21, Item 35, report of the Deputy City Manager, Planning and Growth Management, dated June 5, 2018:

1. THAT Official Plan Amendment File OP.17.010 (Teston Sands Inc.) BE APPROVED; to amend Site-Specific Policy 13.20 (Attachment #6) of the Vaughan Official Plan 2010 (VOP 2010), Volume 2 to redesignate the Subject Lands from "Natural Areas" to "Low-Rise Residential" subject to the "Low-Rise Residential" policies of VOP 2010.
2. THAT the implementing Official Plan Amendment include the following policy to the satisfaction of York Region:  
"The southern portion of the Subject Lands may be affected by the recommendations of the Teston Road Individual Environmental Assessment ("IEA") and that a portion may be subject to the Holding Symbol "(H)" provisions under the Planning Act, implemented through subsequent development applications. If it is determined that the lands are not required for the Teston Road extension, the underlying land use designations identified in this Plan shall prevail, without the need for further amendment to this Plan. Subsequent



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development applications will need to be consistent with the findings of the approved Teston Road IEA."

3. THAT Zoning By-law Amendment File Z.17.026 (Teston Sands Inc.) BE APPROVED; to amend Zoning By-law 1-88, to rezone the Subject Lands from "A Agricultural Zone" and "OS5 Open Space Environmental Protection Zone" to "RD1 Residential Detached Zone One", "RD3 Residential Detached Zone Three", "RD3 (H) Residential Detached Zone Three" with the Holding Symbol "(H)", OS1 (H) "Open Space Conservation Zone" with the Holding Symbol "(H)", and "OS5 Open Space Environmental Protection Zone in the manner shown on Attachment #4."
4. THAT the Holding Symbol "(H)" shall not be removed from the lands zoned "RD3(H) Detached Residential Zone Three" with the Holding Symbol "(H)" and "OS1(H) Open Space Conservation Zone" with the Holding Symbol "(H)" as shown on Attachment #4, until the following matters have been addressed to the satisfaction of the City, York Region and the Toronto and Region Conservation Authority:
  - i) For Lots 1 to 5 and Block 92 (Stormwater Management Pond) until York Region has completed the design and is satisfied the vertical and horizontal design is approved or until the Region has sufficient certainty regarding the potential alignment(s) of the Teston Road extension, or in the likelihood of its ultimate approval and construction; and,
  - ii) For Lots 46 to 53, Lots 1 to 7 and Blocks 91 and 92 until such time as the design of Teston Road has been completed and approved by York Region and until an alternative stormwater management solution which does not require these lands is approved by the City, York Region and the Toronto and Region Conservation Authority.
5. THAT the Owner be permitted to apply for a Zoning By-law Amendment application(s) or a Minor Variance Application(s) to the City and/or the Vaughan Committee of Adjustment, if required, before the second anniversary of the day on which the implementing Zoning By-law for the Subject Lands comes

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into effect, to permit minor adjustments to the implementing Zoning By-law.

6. THAT Draft Plan of Subdivision File 19T-17V009 (Teston Sands Inc.) as shown on Attachment #4 BE APPROVED; to facilitate a residential plan of subdivision consisting of 87 lots that would be developed with detached dwellings, subject to the Conditions of Draft Plan Approval set out in Attachment #1.
7. THAT the Subdivision Agreement for Draft Plan of Subdivision File 19T-17V009 (Teston Sands Inc.) shall contain the following clause:
  - i) "The Owner shall pay to the City of Vaughan by way of certified cheque, cash-in-lieu of the dedication of parkland equivalent to 5% or 1 ha per 300 dwelling units of the value of the Subject Lands, prior to the issuance of a Building Permit, in accordance with the Planning Act and the City's Cash-in-lieu Policy. The Owner shall submit an appraisal of the Subject Lands, in accordance with Section 42 of the Planning Act, prepared by an accredited appraiser for approval by the Office of the City Solicitor, Real Estate Department, and the approved appraisal shall form the basis of the cash-in-lieu payment."
8. THAT Vaughan Council adopt the following resolution for allocation of water and sewage servicing capacity:

"IT IS HEREBY RESOLVED THAT Draft Plan of Subdivision File 19T-17V009 (Teston Sands Inc.) be allocated servicing capacity from the York Sewage Servicing / Water Supply System for a total of 87 residential units (311 persons equivalent).

CARRIED

ITEM - 42 ZONING BY-LAW AMENDMENT FILE Z.16.038 SITE DEVELOPMENT FILE DA.16.046 DRAFT PLAN OF CONDOMINIUM (COMMON ELEMENT) FILE 19CDM-16V006 PINE VALLEY ENCLAVE II LTD. VICINITY OF PINE VALLEY DRIVE AND LANGSTAFF ROAD

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MOVED by Councillor Iafrate  
seconded by Councillor Yeung Racco

THAT Item 42, Committee of the Whole Report No. 21 be adopted without amendment.

CARRIED

### **ITEM - 24    DELEGATION OF AUTHORITY**

MOVED by Councillor Yeung Racco  
seconded by Councillor DeFrancesca

THAT Item 24, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the following in accordance with communication C6, from the Deputy City Manager, Planning and Growth Management, dated June 19, 2018:

1. That Attachment 1, being Schedule "A" to this Communication, be added as additional delegated authority for the Policy Planning and Environmental Sustainability Department to Schedule "A" of Item 5.24 "DELEGATION OF AUTHORITY" of the Committee of the Whole June 5, 2018; and
2. That Council authorize the delegation of authority to those members of staff designated in Attachment 1 of this Communication subject to the conditions set out therein, pursuant to Section 23.1 of the Municipal Act, 2001 and such other applicable legislation, and that said authority be implemented through the enactment of a by-law; and

CARRIED

Refer to Minute No. 96 for disposition regarding this matter.

### **ITEM - 24    RECONSIDERATION                   DELEGATION OF AUTHORITY**

MOVED by Councillor Yeung Racco  
seconded by Councillor DeFrancesca

THAT Item 24, Committee of the Whole Report No. 21 be reconsidered and considered in Council (Closed Session) for the purpose of receiving a

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confidential verbal communication related to this report in relation to labour relations.

CARRIED UPON A 2/3 VOTE

Refer to Minute No. 93 for disposition regarding this matter.

### **ITEM - 31    TRAFFIC SAFETY AROUND SCHOOLS AND ACTIVE                   SCHOOL TRAVEL**

MOVED by Regional Councillor Ferri  
seconded by Regional Councillor Singh

THAT Item 31, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the recommendation contained in communication C8, revised resolution submitted Regional Councillor Ferri, dated June 19, 2018, as follows, subject to replacing the phrase "Working Group" with "Task Force" in recommendation 1.:

Whereas, student safety and traffic congestion around school sites are recurring concerns raised by the community; and

Whereas, encouraging children to walk, cycle or use other active modes of transportation to school will increase their physical activity; and

Whereas, the City employs school crossing guards to increase the safe crossing of students as they travel to and from school; and

Whereas, York Region Public Health Services and the School Boards have been a leading advocate in implementing School Travel Planning within the Region; and

Whereas, City staff and By-law Officers have been actively engaged with the York Regional Police to address traffic safety issues that involve education, engineering and enforcement; and

Whereas, York Region successfully completed a traffic study for Father John Kelly Catholic Elementary School outlining the importance of various partners working together to improve road safety (copy attached); and

Whereas, the City is currently undertaking a Traffic Strategy study, which includes development of a Traffic Data Management Program, a Road Safety Program and a Traffic Management and Control Program, aligned with the Term of Council Priorities; and

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Whereas, the recommendations of the Traffic Strategy are presently scheduled to be presented to Council in Q2 2019; and

Whereas, the City can take a leadership role in pulling together the various agencies involved in facilitating road safety education, promoting active travel to school, addressing road safety through engineering measures, strengthening sense of community, promoting healthy life styles and furthering collaboration and efficiencies in service delivery; and

Whereas, improving safety around school zones and promoting active school travel align with the following Term of Council Priorities:

- (1) Continue to ensure the safety and well-being of citizens; and
- (2) Continue to develop transit, cycling and pedestrian options to get around the City.

It therefore recommended:

1. That the Traffic Strategy recommendations include the establishment of a formal, staff level Working Group focused on Traffic Safety Around Schools and Active Travel to School, led by the City of Vaughan, and include representation from York Region Transportation Services, York Region Public Health, York Regional Police, York Region District School Board, York Catholic District School Board and Smart Commute North Toronto Vaughan; and
2. That City staff be directed to work with stakeholders to develop a brochure outlining the roles and responsibilities of the various governments, agencies and boards responsible for traffic safety around school zones and promoting active travel to school; and
3. That a copy of this resolution be sent to the Regional Municipality of York, York Regional Police, York Region District School Board, York Catholic District School Board and Smart Commute North Toronto Vaughan;

By receiving the member's resolution of Regional Councillor Ferri, dated June 5, 2018.

### **AMENDMENT**

MOVED by Councillor Shefman  
seconded by Councillor Yeung Racco

THAT Item 31, Committee of the Whole Report No. 21 be further amended, as follows:

By approving that a forum be held to discuss and initiate the issues



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identified in the resolution.

NOT VOTED UPON

Upon the question of the main motion, as amended:

CARRIED UNANIMOUSLY UPON A RECORDED VOTE

YEAS

NAYS

Councillor Shefman  
Councillor Yeung Racco  
Regional Councillor Singh  
Regional Councillor Ferri  
Mayor Bevilacqua  
Regional Councillor Rosati  
Councillor Carella  
Councillor Iafrate

ITEM - 33 NEW COMMUNITY AREA - BLOCK 27 SECONDARY PLAN  
STUDY FILE 26.4.1

MOVED by Councillor Iafrate  
seconded by Regional Councillor Singh

THAT Item 33, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the following in accordance with communication C10, from the Deputy City Manager, Planning and Growth Management and the Director of Policy Planning and Environmental Sustainability, dated June 18, 2018:

1. That the proposed draft Block 27 Secondary Plan be revised in a manner identified under the Background and Analysis section of the Memorandum dated, June 18, 2018; and

By receiving the following communications:

- C1 Mr. Adam Grossi, Humphries Planning Group Inc., Chrislea Road, Vaughan, dated June 5, 2018;
- C2 Mr. Michael Melling, Davies Howe, Adelaide Street West, Toronto, dated June 5, 2018; and
- C12 Nr. Tony Nicoletti, dated June 19, 2018.

CARRIED

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ITEM - 40 ZONING BY-LAW AMENDMENT FILE Z.17.022 DRAFT PLAN OF SUBDIVISION FILE 19T-17V007 NASHVILLE (BARONS) DEVELOPMENTS INC. & NASHVILLE (10 ACRES) DEVELOPMENT INC. WARD 1 - VICINITY OF HUNTINGTON ROAD AND NASHVILLE ROAD

MOVED by Regional Councillor Rosati  
seconded by Regional Councillor Ferri

THAT Item 40, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the following in accordance with communication C5, from the Deputy City Manager, Planning and Growth Management, dated June 13, 2018:

1. That Attachment #1b in the report dated June 5, 2018 for Zoning By-law Amendment and Draft Plan of Subdivision Files Z.17.022 and 19T-17V007 (Nashville (Barons) Developments Inc. & Nashville (10 Acres) Developments Inc.) be deleted and replaced with Attachment #1b) York Region Conditions of Approval, dated February 21, 2018, attached hereto.

CARRIED

### **92. RECONSIDERATION ADOPTION OR CORRECTION OF MINUTES**

MOVED by Councillor DeFrancesca  
seconded by Regional Councillor Singh

THAT the minutes of the meeting of May 23, 2018 and Special Council meeting of June 8, 2018 be reconsidered.

CARRIED UPON A 2/3 RECORDED VOTE

#### YEAS

Councillor Shefman  
Councillor Yeung Racco  
Regional Councillor Singh  
Regional Councillor Ferri  
Mayor Bevilacqua  
Regional Councillor Rosati  
Councillor DeFrancesca

#### NAYS

Councillor Carella  
Councillor Iafrate

## COUNCIL MEETING MINUTES – JUNE 19, 2018

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MOVED by Councillor DeFrancesca  
seconded by Regional Councillor Singh

THAT the minutes of the meeting of May 23, 2018 and Special Council meeting of June 8, 2018 be adopted and amended, as follows:

1. That the following recommendations approved by Council at its meeting May 23, 2018, Committee of the Whole Report 18, "Community Impact Review of Board of Trade Golf Course Development Proposal", be deleted:
  - 1) "2) That recommendation 1. contained in the resolution provided by Councillor Carella dated May 8, 2018, be replaced with the following amended recommendation:
    1. That staff be directed to undertake such studies, which may include, subject to an appropriate funding source being identified and consistency with the Official Plan, a cultural heritage landscape evaluation, an environmental impact study, an economic analysis, a comprehensive land use analysis, health impact analysis, and a community impact assessment, and retain such consultants as are necessary to address the above City-wide land use planning concerns and prepare any recommended amendments to the City's land use planning policies in respect of infill developments;" and
  - 2) "1. That staff be directed to undertake such studies and retain such consultants as are necessary to address the above City-wide land use planning concerns and prepare any recommended amendments to the City's land use planning policies in respect of infill developments; and
  3. That the necessary funding source be identified."
- 3) "2) That should an application for these lands be submitted before the studies are completed, staff immediately report to Council;"

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CARRIED UPON A RECORDED VOTE

YEAS

Councillor Shefman  
Councillor Yeung Racco  
Regional Councillor Singh  
Regional Councillor Ferri  
Mayor Bevilacqua  
Regional Councillor Rosati  
Councillor DeFrancesca

NAYS

Councillor Carella  
Councillor Iafrate

Refer to Minute No. 88 for further disposition regarding this matter.

**93. CONSIDERATION OF ITEMS REQUIRING SEPARATE DISCUSSION**

**COMMITTEE OF THE WHOLE (PUBLIC HEARING) REPORT NO. 22**

(Refer to Committee Report for complete recommendations and documentation on all Committee items.)

ITEM - 4      OFFICIAL PLAN AMENDMENT FILE OP.18.005 ZONING  
BY-LAW AMENDMENT FILE Z.18.009 DRAFT PLAN OF  
SUBDIVISION FILE 19T-18V005 1930328 ONTARIO INC.  
VICINITY OF MAPLECRETE ROAD AND REGIONAL  
ROAD 7

MOVED by Councillor DeFrancesca  
seconded by Regional Councillor Rosati

THAT Item 4, Committee of the Whole (Public Hearing) Report No. 22 be  
adopted without amendment.

CARRIED

**COMMITTEE OF THE WHOLE REPORT NO. 21**

(Refer to Committee Report for complete recommendations and documentation on all Committee items.)

ITEM - 48      THE COUNTRY CLUB, 20 LLOYD STREET, WOODBRIDGE  
– TREE PROTECTION

MOVED by Regional Councillor Ferri  
seconded by Councillor DeFrancesca

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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THAT Item 48, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the following:

1. That Council not proceed with adopting the proposed amendment to the Tree Protection By-law for the property municipally known as 20 Lloyd Street, Vaughan, operated as The Country Club Golf Course; and
2. That Council allow staff to conclude the public consultation process regarding the City's Tree Protection By-law prior to consideration of a site-specific amendment to the Tree Protection By-law for the subject property; and

By receiving the following communications:

- C3 Mr. Mark R. Flowers, Davies Howe, Adelaide Street West, Toronto, dated June 5, 2018; and
- C13 Director & Chief Licensing Officer, By-law & Compliance, Licensing & Permit Services, the Director Policy Planning & Environmental Sustainability and the Director Development Planning, dated June 19, 2018.

CARRIED

### **SPECIAL COMMITTEE OF THE WHOLE REPORT NO. 25**

(Refer to Committee Report for complete recommendations and documentation on all Committee items.)

ITEM - 1 INTEGRITY COMMISSIONER CODE OF CONDUCT  
COMPLAINT INVESTIGATION REPORT #052818(F) IN  
RESPECT OF COUNCILLOR TONY CARELLA

MOVED by Councillor Iafrate  
seconded by Councillor Yeung Racco

THAT Item 1, Special Committee of the Whole Report No. 25 be adopted and amended, as follows:

By approving the following:

The council of the city of Vaughan is committed to respect for and adherence to the policies and by-laws of the city, including



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adherence to honest and fair employment practices and confidentiality in employment matters; and

In respect of the report of the Integrity Commissioner code of conduct complaint investigation report #052818(f), this Council strongly condemns the statement and actions of Councillor Tony Carella and makes the following official statement:

- That the Member made false statements about the alleged termination of a former employee;
- That the Member contravened the Council Code of Conduct by making the statements; and
- That Council is censoring the Member for having made the statements pursuant to s. 223.4(5) of the MA and s. 12 of the Complaint Protocol.

CARRIED

Having previously declared an interest Councillor Carella did not take part in the discussion or vote on the foregoing matter.

Addendum Item

**94. PROCLAMATION AND FLAG RAISING REQUEST ISLAMIC  
HERITAGE MONTH**  
(Addendum No. 1)

MOVED by Councillor Iafrate  
seconded by Regional Councillor Rosati

That the recommendation contained in the following report of the City Clerk, dated June 19, 2018, be approved.

CARRIED

Report of the City Clerk, dated June 19, 2018

**Purpose**

To seek Council approval to proclaim October 2018 as Islamic Heritage Month, for the City of Vaughan to participate in a flag raising event at City Hall for Islamic Heritage Month (on a date to be later determined), and to post the proclamation on the City's website and the City Page Online.

### **Report Highlights**

- Respond to the proclamation and flag raising request received from Ahmadiyya Muslim Jama'at, Vaughan.
- Proclamation requested for the month of October.
- Flag raising event requested for a date to be determined in October.

### **Recommendations**

1. That October 2018 be proclaimed as Islamic Heritage Month;
2. That the City of Vaughan participate in a flag raising event for Islamic Heritage Month on a date to be later determined, with the flag being raised for a period up to and no longer than one week at City Hall; and
3. That the proclamation be posted on the City's website and the City Page Online.

### **Background**

Correspondence was received from Ahmadiyya Muslim Jama'at, Vaughan in the Office of the City Clerk on June 7, 2018.

The government of Ontario has declared October to be Islamic Heritage Month. Proclaiming Islamic Heritage Month in Vaughan will provide an opportunity for the public to reflect, celebrate and learn about Islamic history, as well as learn about the roles and contributions of Muslims in their community.

### **Previous Reports/Authority**

Not applicable.

### **Analysis and Options**

The proclamation and flag raising request meets the requirements of the City's Proclamation Policy and Flag Raising/Half Masting policy, as follows:

"That upon request, the City of Vaughan issue Proclamations for events, campaigns, or other similar matters: If the event, campaign or declaration is directly related to matters over which the City has jurisdictions or the City directly sponsors the event, campaign or other matter"; and

"In recognition of the ethnic diversity of the residents of the municipality the City of Vaughan will fly at the Civic Centre the flag of any nation, country or ethnic group on the national day or on the anniversary of a special occasion, upon a written request to the City Clerk submitted one month in advance by that nation, or ethnic group or its representatives."

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### **Financial Impact**

Not applicable.

### **Broader Regional Impacts/Considerations**

This proclamation and flag raising request would reflect the directive of the government of Ontario by declaring October to be Islamic Heritage Month.

### **Conclusion**

Staff is asking for Council approval to proclaim October 2018 as Islamic Heritage Month, for the City of Vaughan to participate in a flag raising event at City Hall for Islamic Heritage Month (on a date to be later determined), and to post the proclamation on the City's website and the City Page Online.

**For more information**, please contact: Todd Coles, City Clerk

### **Attachment**

1. Correspondence from Ahmadiyya Muslim Jama'at, Vaughan, dated June 4, 2018

### **Prepared by**

Julia Bartolomeo, Supervisor, City Clerk's Administrative Services, ext. 8280

(A copy of the attachments referred to in the foregoing have been forwarded to each Member of Council and a copy thereof is also on file in the office of the City Clerk.)

## **95. RESOLUTION TO RESOLVE INTO CLOSED SESSION**

MOVED by Regional Councillor Singh  
seconded by Councillor Shefman

That Council resolve into Closed Session for the purpose of discussing the following matters:

1. LOCAL PLANNING APPEAL TRIBUNAL  
VAUGHAN METROPOLITAN CENTRE SECONDARY PLAN  
ROYAL 7 DEVELOPMENTS LTD.  
WARD 4  
(Committee of the Whole (Closed Session) Report No. 24, Item 6)  
(litigation or potential litigation)

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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2. **RECRUITMENT UPDATE – CHIEF FINANCIAL OFFICER AND CITY TREASURER**  
(Committee of the Whole (Closed Session) Report No. 24, Item 7)  
(personal matter about an identifiable individual)

3. **DELEGATION OF AUTHORITY**  
(Committee of the Whole Report No. 21, Item 24)  
(labour relations)

CARRIED

Council recessed at 2:46 p.m.

MOVED by Regional Councillor Ferri  
seconded by Councillor Iafrate

THAT Council reconvene at 3:47 p.m.

CARRIED

Council reconvened at 3:47 p.m. with all members present.

### **96. CONSIDERATION OF ITEMS REQUIRING SEPARATE DISCUSSION**

#### **COMMITTEE OF THE WHOLE REPORT NO. 21**

(Refer to Committee Report for complete recommendations and documentation on all Committee items.)

##### **ITEM - 24 DELEGATION OF AUTHORITY**

MOVED by Regional Councillor Rosati  
seconded by Regional Councillor Singh

THAT Item 24, Committee of the Whole Report No. 21 be adopted and amended, as follows:

By approving the confidential recommendation of the Council (Closed Session) meeting of June 19, 2018;

By approving the following in accordance with communication C6, from the Deputy City Manager, Planning and Growth Management, dated June 19, 2018:

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1. That Attachment 1, being Schedule “A” to this Communication, be added as additional delegated authority for the Policy Planning and Environmental Sustainability Department to Schedule “A” of Item 5.24 “DELEGATION OF AUTHORITY” of the Committee of the Whole June 5, 2018; and
2. That Council authorize the delegation of authority to those members of staff designated in Attachment 1 of this Communication subject to the conditions set out therein, pursuant to Section 23.1 of the Municipal Act, 2001 and such other applicable legislation, and that said authority be implemented through the enactment of a by-law; and

By approving the following in accordance with communication C11, from the City Manager, dated June 19, 2018:

1. That Council receive a confidential verbal communication related to this report in relation to labour relations.

CARRIED

Refer to Minute No. 91 for further disposition regarding this matter.

### **COMMITTEE OF THE WHOLE (CLOSED SESSION) REPORT NO. 24**

(Refer to Committee Report for complete recommendations and documentation on all Committee items.)

ITEM - 6      LOCAL PLANNING APPEAL TRIBUNAL VAUGHAN  
METROPOLITAN CENTRE SECONDARY PLAN ROYAL 7  
DEVELOPMENTS LTD.  
WARD 4

MOVED by Councillor Carella  
seconded by Councillor Iafrate

THAT Item 6, Committee of the Whole (Closed Session) Report No. 24 be adopted and amended, as follows:

By approving the confidential recommendation of the Council (Closed Session) meeting of June 19, 2018.

CARRIED



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### **ITEM - 7      RECRUITMENT UPDATE – CHIEF FINANCIAL OFFICER AND CITY TREASURER**

MOVED by Regional Councillor Ferri  
seconded by Councillor DeFrancesca

THAT Item 7, Committee of the Whole (Closed Session) Report No. 24 be adopted and amended, as follows:

By approving the confidential recommendation of the Council (Closed Session) meeting of June 19, 2018; and

CARRIED

### **97.      BY-LAWS**

MOVED by Councillor Yeung Racco  
seconded by Councillor DeFrancesca

THAT the following by-laws be enacted:

- |                        |  |
|------------------------|--|
| By-Law Number 099-2018 | A By-law to enable a Municipal Funding Agreement regarding Ontario's 'Mainstreet Revitalization Initiative'. (Item 19, Finance, Administration and Audit Committee, Report No. 6)  |
| By-Law Number 100-2018 | A By-law to adopt Amendment Number 24 to the Vaughan Official Plan 2010 for the Vaughan Planning Area. (Item 14, Committee of the Whole, Report No. 21)  |
| By-Law Number 101-2018 | A By-law to designate by Number an amendment to City of Vaughan By-law Number 1-88, as effected by the Ontario Municipal Board. (Z.12.038, 19T-06V12, Country Wide Homes (Pine Valley Estates) Inc.) (Council, May 14, 2013, Item 21, Committee of the Whole, Report No. 19) |
| By-Law Number 102-2018 | A By-law to designate by Number an amendment to City of Vaughan By-law Number 1-88, as effected by the Ontario Municipal Board. (Z.14.010, 19TV004, Country Wide Homes (Teston Road) Inc.) (Council, July 16, 2015, Item 14, Committee of the Whole, Report No. 29)          |

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By-Law Number 103-2018	A By-law authorizing the Mayor and Clerk to execute the necessary multi-party agreements on behalf of the City of Vaughan with respect to municipal servicing from the City of Toronto. (Council, June 27, 2017, Item 34, Committee of the Whole, Report No. 26)
By-Law Number 104-2018	A By-law to amend By-law 076-2016 to change the definition of “Eligible Resident” to exclude residents who are receiving grants or rebates for home dialysis from other government agencies. (Council, May 23, 2018, Item 10, Finance, Administration and Audit Committee, Report No. 5)
By-Law Number 105-2018	A By-law to adopt property tax rates, tax ratios and to provide for the general local municipality levy and collection of levies required by the Corporation of the City of Vaughan (the “City”) for the year 2018 and to provide for the issuance of tax bills requiring payment of taxes for the year 2018. (Item 7, Finance, Administration and Audit Committee, Report No. 6)
By-Law Number 106-2018	A By-law to amend By-law 72-2003 to delegate authority relating to assessment and taxation appeal matters to staff. (Item 14, Finance, Administration and Audit Committee, Report No. 6)
By-Law Number 107-2018	A By-law to amend the Consolidated Traffic By-law 284-94 as amended, to govern and control traffic in the City of Vaughan. (Huntington Road) (Council, April 11, 2018, Item 10, Committee of the Whole, Report No. 14)
By-Law Number 108-2018	A By-law to amend By-law 1-96 as amended, to govern and control the parking of vehicles in the City of Vaughan. (Via Campanile) (Item 15, Committee of the Whole, Report No. 21)
By-Law Number 109-2018	A By-law to amend the Consolidated Traffic By-law 284-94 as amended, to govern and control traffic in the City of Vaughan. (Via Campanile from the north limit of Pierre Berton Public School to the north limit of Cappella Drive / Corso Garibaldi Road) (Item 15, Committee of the Whole, Report No. 21)

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- |                        |  |
|------------------------|--|
| By-Law Number 110-2018 | A By-law to amend the Consolidated Traffic By-law 284-94, as amended, to govern and control traffic in the City of Vaughan. (Barons Street and Secord Avenue / Danby Street) (Item 44, Committee of the Whole, Report No. 21)  |
| By-Law Number 111-2018 | A By-law to exempt parts of Plan 65M-4557 from the provisions of Part Lot Control. (Z.13.042, 19T-3V009, OP.08.008, DA.16.072, Monarch Castlepoint Kipling North, located on the west side of Kipling Avenue, south of Kirby Road, being Blocks 169 to 173 inclusive, on Registered Plan 65M-4557, in Part of Lots 28 and 29, Concession 8) (Delegation By-law 005-2018) |
| By-Law Number 112-2018 | A By-law to exempt parts of Plan 65M-4578 from the provisions of Part Lot Control. (19T-06V01, Squire Ridge Investments Ltd., located on the south side of Langstaff Road, east of Huntington Road, being Blocks 3, 4, 8 and 9, on Registered Plan 65M-4578, in Part of Lots 10 and 11, Concession 9) (Delegation By-law 005-2018)                                       |
| By-Law Number 113-2018 | A By-law to exempt parts of Plan 65M-4491 from the provisions of Part Lot Control. (PLC.18.012, Major Ridge (ARH) Homes Ltd., located north of Major Mackenzie Drive and east of Via Romano Blvd. being Block 276 on Registered Plan 65M-4491, in Part of Lot 21, Concession 2) (Delegation By-law 005-2018)   |
| By-Law Number 114-2018 | A By-law to exempt parts of Plan 65M-4491 from the provisions of Part Lot Control. (PLC.18.013, Barn Yard Homes Inc., are located north of Major Mackenzie Drive, on the west side of Via Romano Boulevard being Block 277 on Registered Plan 65M-4491, in Part of Lot 21, Concession 2) (Delegation By-law 005-2018)  |

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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By-Law Number 115-2018	A By-law to amend City of Vaughan By-law 1-88 as amended by By-law 017-2016. (Z.17.023, OP.14.003, Z.14.024, DA.16.044, 19T-16V005, Woodbridge Park Limited, located on the north side of Steeles Avenue West, east of Martin Grove Road, being Part of Lot 1, Concession 8) (Council, October 19, 2016, Item 5, Committee of the Whole, Report No. 36)
By-Law Number 116-2018	A By-law to amend City of Vaughan By-law 1-88. (Z.17.012, DA.17.024, Toronto District Christian High School (TDCH), located on the south side of Woodbridge Avenue, west of Kipling Avenue, being in Part of Lots 6 and 7, Concession 8) (Council, April 11, 2018, Item 2, Committee of the Whole, Report No. 14)
By-Law Number 117-2018	A By-law to amend City of Vaughan By-law 1-88. (Z.16.029, DA.16.059, 2423089 Ontario Corp., located west of Yonge Street, on the south side of Centre Street (19 Centre Street), being Part of Lot 56 on Plan 9834, in Lot 30, Concession 1) (Item 2, Committee of the Whole, Report No. 21)
By-Law Number 118-2018	A By-law to amend City of Vaughan By-law 1-88. (Z.17.017, DA.17.041, Firstgreen Corp., located at 9370 Bathurst Street, on the south side of George Kirby Street, west of Bathurst Street, being part of Block 23, Registered Plan 65M-3918 in Lot 16, Concession 2) (Item 4, Committee of the Whole, Report No. 21)
By-Law Number 119-2018	A By-law to City of Vaughan By-law 1-88. (Z.17.029, DA.17.063, Linmar Properties Inc., located on Keele Street, south of Regional Road 7, being Part of Lot 44 on Registered Plan 2468, in Lot 5, Concession 3) (Item 5, Committee of the Whole, Report No. 21)
By-Law Number 120-2018	A By-law to amend City of Vaughan By-law 1-88. (Item 7, Committee of the Whole, Report No. 21)

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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| By-Law Number 121-2018 | A By-law to amend City of Vaughan By-law 1-88. (Z.17.011, DA.17.023, Landmart Realty Corp., located on the west side of Islington Avenue, north of Rutherford Road, being Part of Lot 18, Concession 8, and are municipally known as 9560 Islington Avenue) (Item 37, Committee of the Whole, Report No. 21)   |
| By-Law Number 122-2018 | A By-law to amend City of Vaughan By-law 1-88. (Z.17.043, DA.18.010, Omers Realty Corporation, located southwest of the intersection of Regional Road 7 and Regional Road 27, in Part of Lots 3 and 4, Concession 9, and are municipally known as 111 Royal Group Crescent) (Item 38, Committee of the Whole, Report No. 21)   |
| By-Law Number 123-2018 | A By-law to amend City of Vaughan By-law 1-88 as amended by By-law 107-2014. (Z.17.044, DA.17.086, York Holdings Inc., located on the north side of Eagle Rock Way, west of Troon Avenue, and are municipally known as 100 and 110 Eagle Rock Way (also known as Phase 2), being Part of Block 35 on Plan 65M-4477, Part of Lot 21, Concession 3)(Lifting "H" Symbol) (Item 41, Committee of the Whole, Report No. 21) |
| By-Law Number 124-2018 | A By-law to amend City of Vaughan By-law 1-88. (Z.17.042, DA.17.109, Vedette Way Homes Limited, located east of Weston Road, south of Canada Drive, specifically on the east side of Vedette Way, being Lots 1 and 2 on Registered Plan 65M-4463, in Lot 23, Concession 5) (Item 47, Committee of the Whole, Report No. 21)  |
| By-Law Number 125-2018 | A By-law to assume Municipal Services in Block 11 Spine Services Agreement – Stormwater Management Pond 5 only. (Delegation By-law 005-2018)   |
| By-Law Number 126-2018 | A By-law to assume Municipal Services in Block 18 Spine Services Agreement – Stormwater Management Pond B1, B2 and C only. (Delegation By-law 005-2018)  |



## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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By-Law Number 127-2018	A By-law to assume Municipal Services in Molise Kleinburg Estates Subdivision Phase 1 (Partial 1) 19T-06V14, Registered Plan 65M-4336. (Delegation By-law 005-2018)
By-Law Number 128-2018	A By-law to assume Municipal Services in McKenzie Ridge Subdivision, 19T-05V11, Registered Plan 65M-4286. (Delegation By-law 005-2018)
By-Law Number 129-2018	A By-law to assume Municipal Services in Molise Kleinburg Estates Phase 2 (Partial 1) Subdivision, 19T-06V14, Registered Plan 65M-4361. (Delegation By-law 005-2018)
By-Law Number 130-2018	A By-law to assume Municipal Services in Arband Phase 2 Subdivision, 19T-00V19, Registered Plan 65M-4113. (Delegation By-law 005-2018)
By-Law Number 131-2018	A By-law to assume Municipal Services in Molise Kleinburg External Services (Related File 19T-06V14). (Delegation By-law 005-2018)
By-Law Number 132-2018	A By-law to assume Municipal Services in Majormack Investments Inc Phase 1 Subdivision, 19T-07V06, Registered Plan 65M-4275. (Delegation By-law 005-2018)
By-Law Number 133-2018	A By-law to assume Municipal Services in Minto Yonge and Arnold Inc. External Services related to DA.08.024. (Delegation By-law 005-2018)
By-Law Number 134-2018	A By-law to assume Municipal Services in Block 33 West Spine Services Agreement. (Delegation By-law 005-2018)
By-Law Number 135-2018	A By-law to dedicate certain lands as part of the public highway. (Delegation By-law 005-2018)
By-Law Number 136-2018	A By-law to dedicate certain lands as part of the public highway. (Delegation By-law 005-2018)

## COUNCIL MEETING MINUTES – JUNE 19, 2018

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By-Law Number 137-2018	A By-law to amend Parking By-law 1-96, with respect to the definitions of Fire Route Signs and Fire Department Connection Signs. (Council, May 23, 2018, Item 16, Committee of the Whole, Report No. 18)
By-Law Number 138-2018	A By-law to amend the Licensing By-law 315-2005 with respect to taxicab ownership and other technical amendments. (Council, May 23, 2018, Item 17, Committee of the Whole, Report No. 18)
By-Law Number 139-2018	A By-law to repeal previous Noise By-laws 96-2006, 207-2007 and 015-2018. (Council, January 30, 2018, Item 8, Committee of the Whole, Report No. 2)
By-Law Number 140-2018	A By-law to regulate <i>Signs</i> in the <i>City</i> of Vaughan. (Item 20, Committee of the Whole, Report No. 21)
By-Law Number 141-2018	A By-law to dedicate certain lands as part of the public highway. (Zenway Boulevard, 65R-37830, DA.17.021, Sevenplex Developments Inc.) (Delegation By-law 005-2018)
By-Law Number 142-2018	A By-law to adopt Amendment Number 27 to the Vaughan Official Plan 2010 for the Vaughan Planning Area. (Z.15.030, OP.15.007, 19T-17V00, Islington Steeles Ventures Inc., located on the west side of Islington Avenue, north of Steeles Avenue West, and are municipally known as 7082 Islington Avenue, being Lot 26, Registrar's Compiled Plan 9691) (Item 46, Committee of the Whole, Report No. 21)
By-Law Number 143-2018	A By-law to amend City of Vaughan By-law 1-88. (OP.15.007, Z.15030, 19T-17V006, Islington Steeles Ventures Inc., located west of Islington Avenue, north of Steeles Avenue West, and municipally known as 7082 Islington Avenue, and being Part of Lot 1, Concession 7, Part of Lot 26 on Registrar's Compiled Plan 9691) (Item 46, Committee of the Whole, Report No. 21)

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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| By-Law Number 144-2018 | A By-law to delegate authority regarding certain matters to staff. (Item 24, Committee of the Whole, Report No. 21)   |
| By-Law Number 145-2018 | A By-law to authorize the acquisition of approximately 65.2 hectares of land and to authorize the Mayor and Clerk to execute an Agreement of Purchase and Sale between Her Majesty the Queen in Right of Ontario as Represented by the Minister of Infrastructure and the City of Vaughan. Item 1, Committee of the Whole (Closed Session), Report No. 24)  |
| By-Law Number 146-2018 | A By-law to authorize the sale of lands and to authorize the Mayor and Clerk to execute an Agreement of Purchase and Sale between the Corporation of the City of Vaughan and Metrolinx. (Item 2, Committee of the Whole (Closed Session), Report No. 24)  |
| By-Law Number 147-2018 | A By-law to authorize the acquisition approximately of 0.24 hectares and to authorize the Mayor and Clerk to execute an Agreement of Purchase and Sale between Morgan Mae Enterprises Limited and the City of Vaughan. (Item 3, Committee of the Whole (Closed Session), Report No. 24)   |
| By-Law Number 148-2018 | A By-law to adopt Amendment Number 752 to the Official Plan of the Vaughan Planning Area. (Z.17.010, DA.16.053, DA.17.020, York Major Holdings Inc., located on the east side of McNaughton Road East, south of Eaglet Court, municipally known as 10,000 Dufferin Street, being Part of Lot 22, Concession 3) (Item 3, Committee of the Whole, Report No. 21)  |
| By-Law Number 149-2018 | A By-law to adopt Amendment Number 29 to the Vaughan Official Plan 2010 for the Vaughan Planning Area. (Z.17.010, DA.16.053, DA.17.020, York Major Holdings Inc., located on the southeast corner of McNaughton Road East and Eaglet Court, municipally known as 1 Eaglet Court and part of 10,000 Dufferin Street, being Part of Lot 22, Concession 3) (Item 3, Committee of the Whole, Report No. 21) |

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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By-Law Number 150-2018

A By-law to amend City of Vaughan By-law 1-88, as amended. (Z.17.010, OP.17.004, DA.16.053, DA.17.020, York Major Holdings Inc., located on the east side of McNaughton Road East and south of Eaglet Court, municipally known as 10,000 Dufferin Street and 1 Eaglet Court, in Part of Lots 21 and 22, Concession 3) (Item 3, Committee of the Whole, Report No. 21)

By-Law Number 151-2018

A By-law to amend City of Vaughan By-law 1-88. (Z.17.026, OP.17.010, 19T-17V009, Teston Sands Inc., located on the north side of Teston Road, west of Dufferin Street, in Part of Lot 26, Concession 2) (Item 35, Committee of the Whole, Report No. 21)

By-Law Number 152-2018

A By-law to adopt Amendment Number 28 to the Vaughan Official Plan 2010 for the Vaughan Planning Area. (OP.17.010, Z.17.026, 19T-17V009, Teston Sands Inc., north side of the un-opened Teston Road allowance, west of Dufferin Street, known municipally as 1600 Teston Road, being Part of Lot 26, Concession 2) (Item 35, Committee of the Whole, Report No. 21)

CARRIED

### **98. CONFIRMING BY-LAW**

MOVED by Councillor DeFrancesca  
seconded by Regional Councillor Ferri

THAT By-law Number 153-2018, being a by-law to confirm the proceedings of Council at its meeting on June 19, 2018, be enacted.

CARRIED

## **COUNCIL MEETING MINUTES – JUNE 19, 2018**

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### **99. ADJOURNMENT**

MOVED by Councillor Carella  
seconded by Regional Councillor Ferri

THAT the meeting adjourn at 3:49 p.m.

CARRIED

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Hon. Maurizio Bevilacqua, Mayor

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Todd Coles, City Clerk