Exploring the social and economic impact of schools in small Ontario communities

Community Schools Alliance
August 31, 2021

SPATIALISTS CONSULTING

HEAL
HUMAN ENVIRONMENTS ANALYSIS LABORATORY
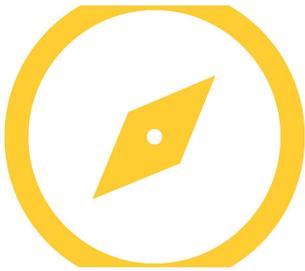
COMMUNITY SCHOOLS ALLIANCE

School age children does not mean there is a school

New dwellings may bring schools to communities

Northern Ontario schools are further away than most

Community amenities co-locate with schools

Key Points

- The number of school age children in communities is not associated with the presence of a school

- New dwellings may bring new schools, or vice-versa

- Northern Ontario schools are consistently further away

- Community amenities are strongly associated with the presence of a school, reflecting broader attractiveness

Background

The past two decades of educational policy in Ontario has resulted in the amalgamation of smaller local schools into larger buildings, and often the closure of schools in smaller communities. Instead of attending school within their local community, many students are forced to attend schools in communities further away from home. This trend towards bussing rural and smaller community students into other communities can have wide-ranging impacts on the health, wellbeing, and stability of students, parents, and affected communities. The impacts of these closures may also not manifest immediately, with longer term impacts being experienced decades later in economic competitiveness and socioeconomic outcomes.

The accommodation review procedure used by the Ontario Ministry of Education and local school boards often fails to account for the unique challenges of serving the educational needs of rural Ontario communities. The Community Schools Alliance has made a lobbying priority changing provincial education and infrastructure policy in the delivery and maintenance of school properties. To support this lobbying goal, evidence of the impacts of geographic distribution of schools in Ontario is needed to inform decision-makers of the potential impact from school closures.

The Community Schools Alliance (CSA) has retained the Human Environments Analysis Lab (HEAL) with partner Spatialists Consulting Ltd to conduct a geospatial investigation of the differences in demographics, community structure, and housing values based on school presence.

Previous Studies

Lyson, T.A. (2002). What does a school mean to a community? Assessing the social and economic benefits of schools to rural villages in New York. National Science Foundation.

- The study identified community-level characteristics associated with the presence or absence of a school
- Results indicate that for the smallest rural communities, the presence of a school was associated with many social and economic benefits
- Housing values were considerably higher in small villages with schools, and municipal infrastructure was more developed
- Places with schools had more people employed in more favorable occupational categories and more employment in civic occupations
- Income inequality and welfare dependence was lower in villages with schools
- **This study shows that schools serve as important markers of social and economic viability and vitality, and that the money that might be saved through school consolidation could be forfeited in lost taxes, declining property values, and lost business**

Previous Studies

Sipple, J.W., Francis, J.D., & Fiduccia, P.C. (2019). Exploring the gradient: The economic benefits of 'nearby' schools on rural communities. Journal of Rural Studies.

- The main goal of the paper is to investigate the area outside villages – what is measured as a 5-mile gradient or boundary
- The paper finds strong support for the assumption that schools are important to the economic vitality of rural communities and supports the method of geo-locating community institutions and measuring distance and concentration – the authors term this: School Proximity Index (SPI)
- The paper found that housing values, per-capita income, and household income significantly and positively vary with the SPI above and beyond the effects of age-structure, proportion of households with children, proportion of population that is white, and self-employment rates
- **The paper determines that while the relationship is indeed positive, whether the presence of a school promotes enhanced community vitality or having high community vitality promotes the presence of a school, must be further examined.**
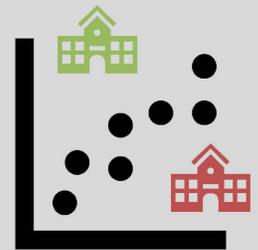
Our Methodology

Locate schools and communities outside of major population centres within the Province of Ontario

Determine communities with a school (within 3.2km of the centre of town) & distance to the nearest school

Understand the sociodemographic structure of each community, and amenities in the community

Determine the statistical differences between communities with schools and without schools using regression modelling

Our Methodology

The study area includes all areas outside of medium to large population centres (30,000 people), as defined by Statistics Canada. Communities in the sample include small population centres (1,000 – 29,999 people) and designated places (< 1000 people) as defined by Statistics Canada. In addition, other smaller communities (300 – 999 people) were manually added to the sample based on their environmental characteristics (i.e., intersection density and block group population). Each community was assigned a point at the centroid of the built-up area. Communities with less than 300 people or more than 10,000 people were removed from the sample.

Amenities such as grocery stores (NAICS 44511), variety stores (44512), pharmacies (44611), doctors (621111) and dental (62121), banks, emergency services (ambulance, fire, police), libraries, community centres, and public parks were also included in the analysis. These locations were all sourced from DMTI Spatial (2016). All other data was sourced from Statistics Canada (2016).

A buffer distance of 3200 metres around the centre of the community was used to determine the presence of a school and/or other amenities within the community. A buffer distance of 1200 metres around the centre of the community was used to select the census dissemination areas (DAs) that comprise the community. Distance from the centre of the community was calculated to the nearest English Public or Catholic elementary (kindergarten to grade 8) and secondary (grade 9 to 12) school. All buffers were generated along the street network, as delineated by the Ontario Ministry of Transportation (2016).

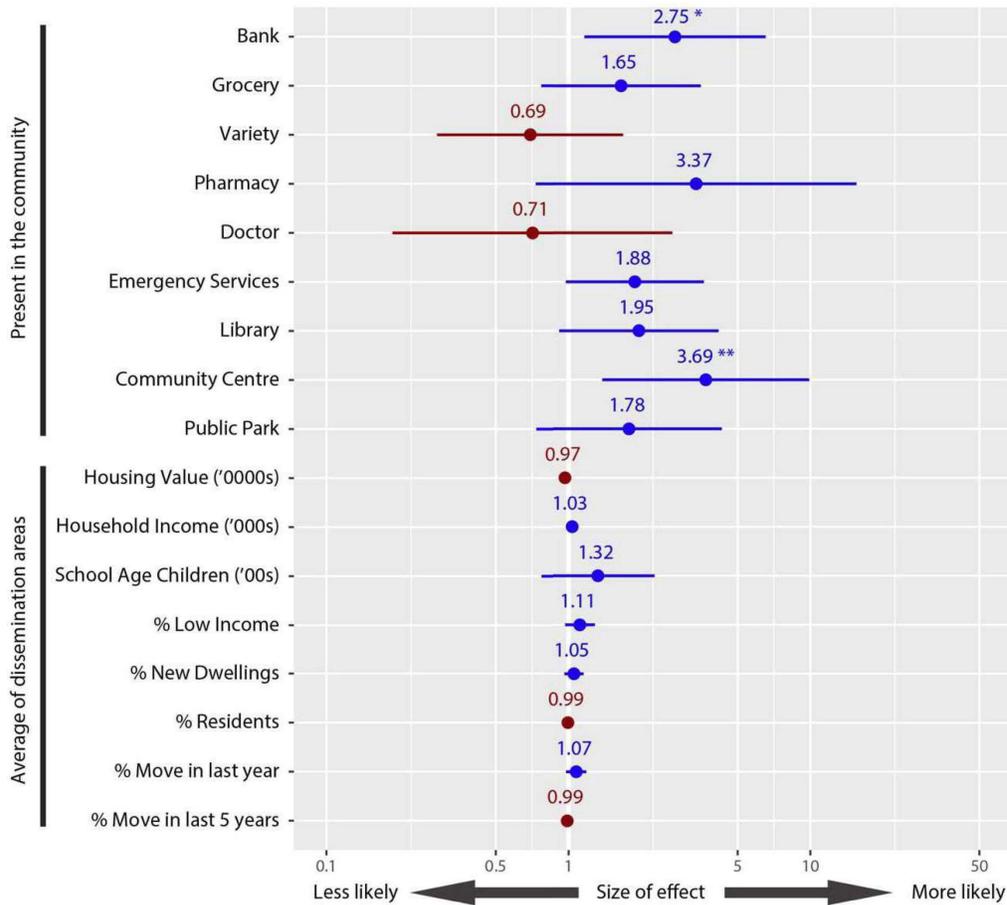| Variable	Communities WITHOUT School, N = 164	Communities WITH School, N = 104
Bank, in community	13 (7.9%)	38 (37%)
Grocery, in community	21 (13%)	39 (38%)
Variety, in community	21 (13%)	23 (22%)
Pharmacy, in community	4 (2.4%)	18 (17%)
Doctor, in community	7 (4.3%)	14 (13%)
Emergency Services, in community	33 (20%)	42 (40%)
Library, in community	25 (15%)	41 (39%)
Community Centre, in community	7 (4.3%)	27 (26%)
Public Park, in community	17 (10%)	17 (16%)
Total Population	994 (746, 1224)	1102 (905, 1310)
# School Age Children	156 (95, 201)	180 (124, 224)
Median housing value	$250318 (193559, 318222)	$221141 (159590, 276913)
Median household income	$64128 (56699, 71936)	$60341 (53632, 70864)
% Low-income	3.35% (2.25, 4.53)	3.55% (2.75, 4.96)
% Residents	90% (69, 95)	89% (72, 95)
% New Dwellings (2011-16)	2.74% (0, 5.28)	2.70% (0, 5.07)
% Move in last year	7.50% (5.60, 10.50)	8.90% (6.80, 11.30)
% Move in last 5 years	25% (22, 30)	27% (23, 31)

Profile of Small Communities

2016 population is less than 1500 people

n (% of total in group)

(Median Inter-Quartile Range | 0.25, 0.75)

Variable	Communities WITHOUT School, N = 131	Communities WITH School, N = 334
Bank, in community	18 (14%)	243 (73%)
Grocery, in community	24 (18%)	224 (67%)
Variety, in community	23 (18%)	182 (54%)
Pharmacy, in community	5 (3.8%)	158 (47%)
Doctor, in community	10 (7.6%)	206 (62%)
Emergency Services, in community	42 (32%)	253 (76%)
Library, in community	26 (20%)	197 (59%)
Community Centre, in community	21 (16%)	182 (54%)
Public Park, in community	40 (31%)	231 (69%)
Total Population	1978 (1681, 2444)	2930 (2187, 4820)
# School Age Children	340 (282, 444)	512 (366, 778)
Median housing value	$325353 (266699, 440392)	$260185 (213764, 333568)
Median household income	$71760 (61161, 82994)	$63484 (55912, 75062)
% Low-income	2.97% (2.18, 3.91)	3.83% (2.67, 5.22)
% Residents	94% (81, 97)	95% (91, 97)
% New Dwellings (2011-16)	3.90% (2.00, 5.30)	3.70% (2.00, 5.90)
% Move in last year	8.70% (6.95, 10.83)	10.01% (8.05, 12.04)
% Move in last 5 years	27% (24, 30)	31% (27, 35)

Profile of Large Communities

2016 population is more than 1500 people

n (% of total in group)

(Median Inter-Quartile Range | 0.25, 0.75)

Present in the community

Bank	2.75 *	
Grocery	1.65	
Variety	0.69	
Pharmacy	3.37	
Doctor	0.71	
Emergency Services	1.88	
Library	1.95	
Community Centre	3.69 **	
Public Park	1.78	

Average of dissemination areas

Housing Value ('0000s)	0.97
Household Income ('000s)	1.03
School Age Children ('00s)	1.32
% Low Income	1.11
% New Dwellings	1.05
% Residents	0.99
% Move in last year	1.07
% Move in last 5 years	0.99

0.1   0.5   1   5   10   50

Less likely ◄——— Size of effect ———► More likely
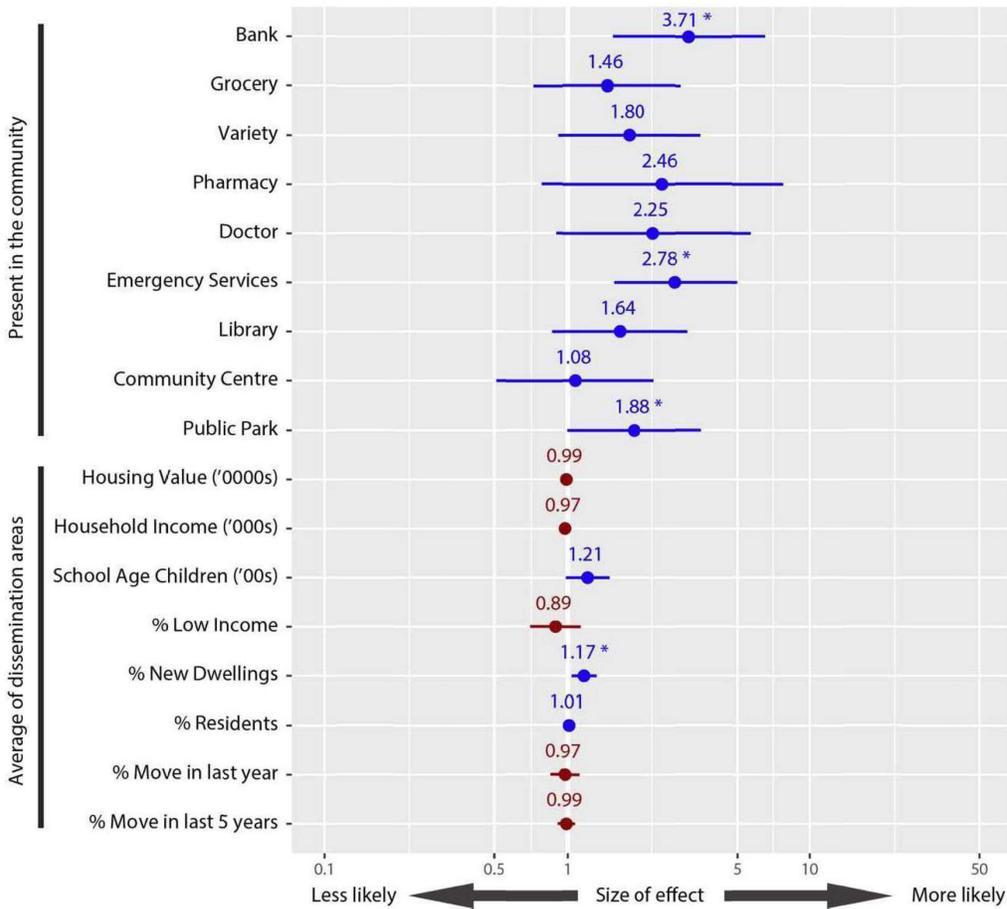
Small Community Factors

2016 population is less than 1500 people

Red means that factor is associated with a community being **less likely** to have a school, while **blue** means it is associated with a community being **more likely** to have a school. The line indicates the range of possible values for that factor. The closer the value is to 1, the smaller the effect.

* Denotes statistical significance (see table for exact values)

Highlights:

- Having a school in the community means it is 2.75x more likely to have a bank, and 3.69x more likely to have a community centre

- Communities without schools have slightly higher housing values, likely because of young families looking for more affordable housing stock in communities that do have schools

Large Community Factors

2016 population is more than 1500 people

Red means that factor is associated with a community being **less likely** to have a school, while **blue** means it is associated with a community being **more likely** to have a school. The line indicates the range of possible values for that factor. The closer the value is to 1, the smaller the effect.

* Denotes statistical significance (see table for exact values)

Highlights:

- Having a school in the community means it is 3.71x as likely to have a bank, 2.78x as likely to have emergency services, and 1.88x as likely to have a public park.

- Communities with a school tend to have a higher percentage of dwellings constructed in the last 5 years.
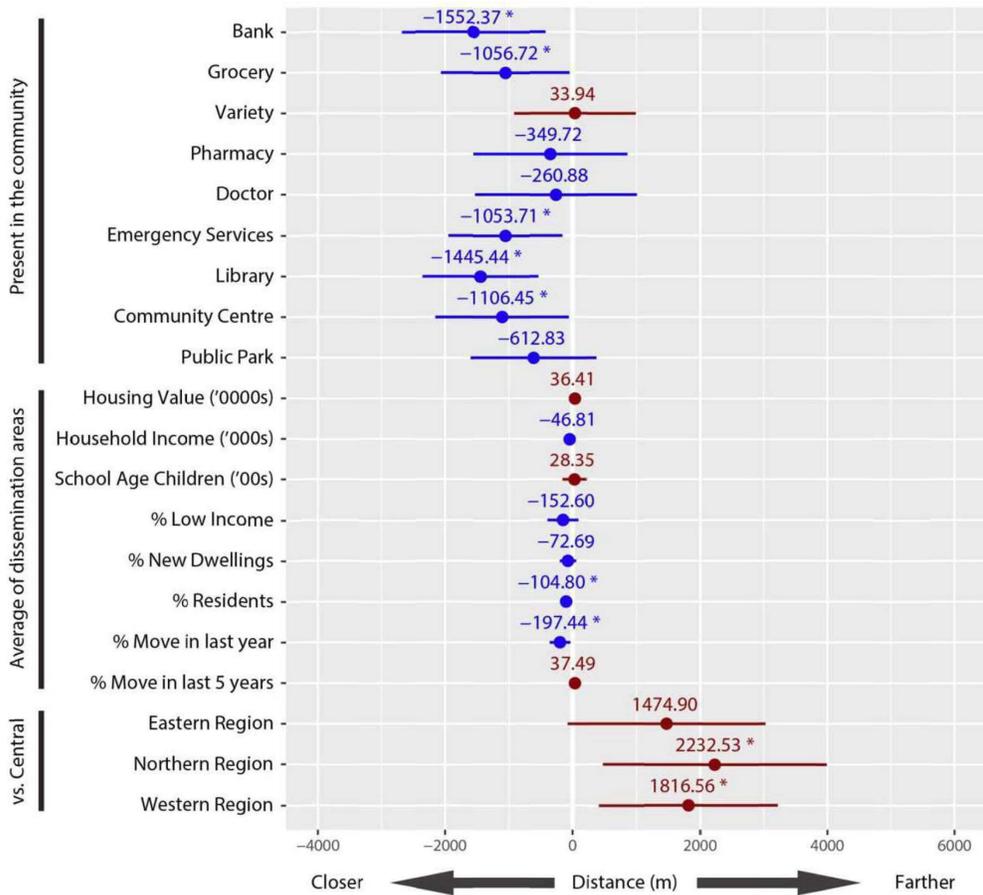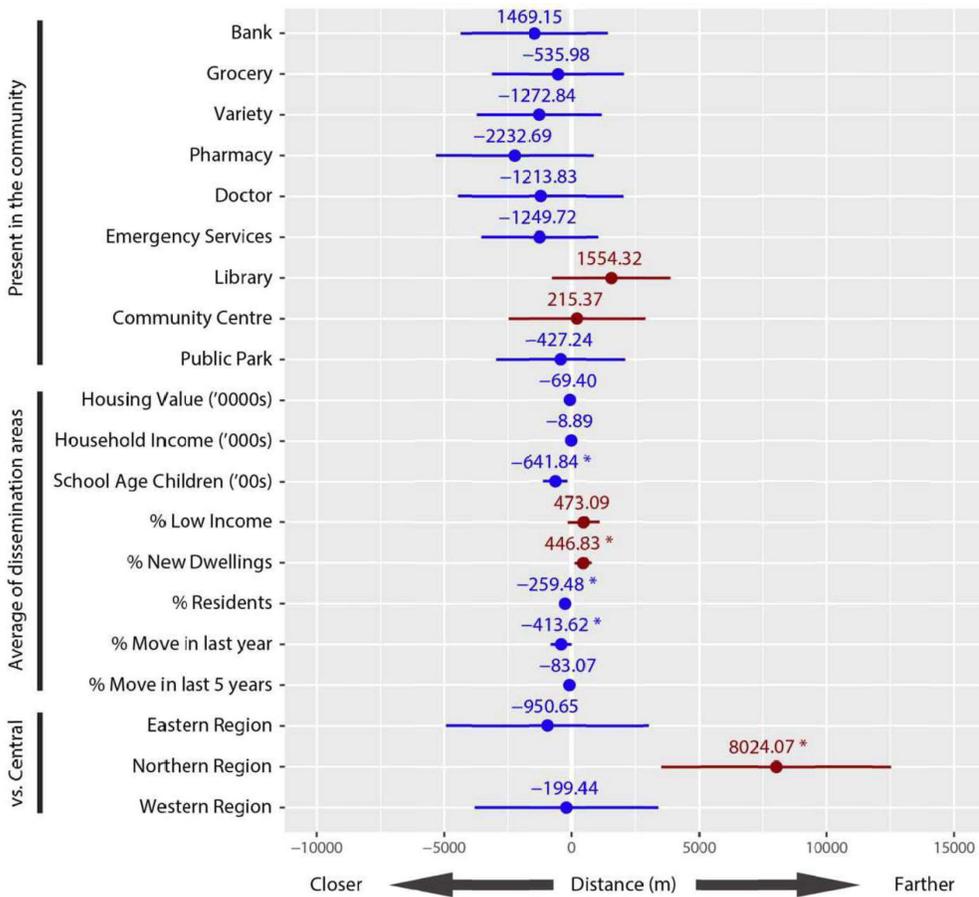
Distance to Elementary

Distance to nearest English Public or Catholic Elementary-Level School

Red means that factor is associated with a community being **further from** a school, while **blue** means it is associated with a community being **closer to** a school. The line indicates the range of possible values for that factor. The closer the value is to 1, the smaller the difference in distance.

* Denotes statistical significance (see table for exact values)

Highlights:

- Having a bank or library in a community means an elementary school is about 1.5km closer on average, while a grocery store, community centre or emergency services means it is about 1 km closer

- Communities with more primary residences and more people that have moved into the community in the last year see a school ~150m closer per %

- Northern and Western Ontario have schools further away than Central Ontario

Present in the community

- Bank: −1552.37 *
- Grocery: −1056.72 *
- Variety: 33.94
- Pharmacy: −349.72
- Doctor: −260.88
- Emergency Services: −1053.71 *
- Library: −1445.44 *
- Community Centre: −1106.45 *
- Public Park: −612.83

Average of dissemination areas

- Housing Value ('0000s): 36.41
- Household Income ('000s): −46.81
- School Age Children ('00s): 28.35
- % Low Income: −152.60
- % New Dwellings: −72.69
- % Residents: −104.80 *
- % Move in last year: −197.44 *
- % Move in last 5 years: 37.49

vs. Central

- Eastern Region: 1474.90
- Northern Region: 2232.53 *
- Western Region: 1816.56 *

Closer ← Distance (m) → Farther

Distance to Secondary

Distance to nearest English Public or Catholic Secondary-Level School

Red means that factor is associated with a community being **further from** a school, while **blue** means it is associated with a community being **closer to** a school. The line indicates the range of possible values for that factor. The closer the value is to 1, the smaller the difference in distance.

* Denotes statistical significance (see table for exact values)

Highlights:

- For every 100 school age children, schools are 641m closer

- For every % point increase in new dwellings, schools are 446m further away

- For every % point increase in residents and new residents in the last year, schools get slightly closer

- Northern Ontario schools are 8km further away than they are in Central Ontario

Variable	OR	95% CI	p-value
Bank, in community	**2.75**	**1.17, 6.65**	**0.02**
Grocery, in community	1.65	0.77, 3.52	0.20
Variety, in community	0.69	0.28, 1.64	0.40
Pharmacy, in community	3.37	0.80, 17.90	0.12
Doctor, in community	0.71	0.18, 2.68	0.60
Emergency Services, in community	1.88	0.97, 3.63	0.06
Library, in community	1.95	0.91, 4.18	0.08
Community Centre, in community	**3.69**	**1.43, 10.50**	**< 0.01**
Public Park, in community	1.78	0.73, 4.33	0.20
Median housing value ('0000s)	**0.97**	**0.93, 1.00**	**0.07**
Median household income ('000s)	1.03	0.99, 1.08	0.10
# School age children ('00s)	1.32	0.77, 2.28	0.30
% Low-income	1.11	0.97, 1.29	0.13
% New Dwellings (2011-16)	1.05	0.96, 1.15	0.30
% Residents	0.99	0.97, 1.01	0.50
% Move in last year	1.07	0.98, 1.18	0.15
% Move in last 5 years	0.99	0.93, 1.05	0.70

Small Community Factors

2016 population is less than 1500 people

OR = Odds Ratio
95% CI = 95% Confidence Interval

Bolded values are statistically significant

N = 268 communities
Akaike Info. Criteria = 321
Log-Likelihood = -143
Pseudo-R^2 = 0.32

Variable	OR	95% CI	p-value
Bank, in community	**3.17**	**1.55, 6.63**	**< 0.01**
Grocery, in community	1.46	0.72, 2.95	0.30
Variety, in community	1.80	0.92, 3.57	0.09
Pharmacy, in community	2.46	0.82, 8.51	0.12
Doctor, in community	2.25	0.91, 5.83	0.08
Emergency Services, in community	**2.78**	**1.56, 5.01**	**< 0.01**
Library, in community	1.64	0.86, 3.15	0.13
Community Centre, in community	1.08	0.51, 2.27	0.80
Public Park, in community	**1.88**	**1.00, 3.58**	**0.05**
Median housing value ('0000s)	0.99	0.95, 1.03	0.50
Median household income ('000s)	0.97	0.92, 1.03	0.30
# School age children ('00s)	1.21	0.99, 1.51	0.07
% Low-income	0.89	0.70, 1.13	0.30
% New Dwellings (2011-16)	**1.17**	**1.04, 1.32**	**0.01**
% Residents	1.01	0.99, 1.04	0.30
% Move in last year	0.97	0.85, 1.12	0.70
% Move in last 5 years	0.99	0.91, 1.07	0.70

Large Community Factors

2016 population is more than 1500 people

OR = Odds Ratio
95% CI = 95% Confidence Interval

Bolded values are statistically significant

N = 465 communities
Akaike Info. Criteria = 347
Log-Likelihood = -156
Pseudo-R^2 = 0.58

Variable	Beta	95% CI	*p*-value
Bank, in community	**-1,552**	**-2,675, -429**	**< 0.01**
Grocery, in community	**-1,057**	**-2,063, -50**	**0.04**
Variety, in community	34	-918, 986	> 0.90
Pharmacy, in community	-350	-1,554, 854	0.6
Doctor, in community	-261	-1,525, 1,004	0.7
Emergency Services, in community	**-1,054**	**-1,945, -162**	**0.02**
Library, in community	**-1,445**	**-2,351, -540**	**< 0.01**
Community Centre, in community	**-1,106**	**-2,152, -61**	**0.04**
Public Park, in community	-613	-1,597, 371	0.20
Median housing value ('0000s)	36	-18, 91	0.20
Median household income ('000s)	-47	-106, 12	0.12
# School age children ('00s)	28	-158, 215	0.80
% Low-income	-153	-394, 89	0.20
% New Dwellings (2011-16)	-73	-201, 55	0.30
% Residents	**-105**	**-136, -74**	**< 0.01**
% Move in last year	**-197**	**-358, -74**	**0.02**
% Move in last 5 years	37	-57, 132	0.40
Eastern Region, against Central	1,475	-75, 3,025	0.06
Northern Region, against Central	**2,233**	**479, 3,986**	**0.01**
Western Region, against Central	**1,817**	**414, 3,219**	**0.01**

Distance to Elementary

Distance to nearest English Public or Catholic Elementary-Level School

Beta = Coefficient of distance (metres)
95% CI = 95% Confidence Interval

Bolded values are statistically significant

N = 733 communities
Akaike Info. Criteria = 14651
Log-Likelihood = -7304
R^2 = 0.32

Variable	Beta	95% CI	p-value
Bank, in community	-1,469	-4,348, 1,410	0.30
Grocery, in community	-536	-3,116, 2,044	0.70
Variety, in community	-1,273	-3,714, 1,168	0.30
Pharmacy, in community	-2,233	-5,319, 854	0.20
Doctor, in community	-1,214	-4,456, 2,028	0.50
Emergency Services, in community	-1,250	-3,535, 1,035	0.30
Library, in community	1,554	-768, 3,877	0.20
Community Centre, in community	215	-2,464, 2,895	0.90
Public Park, in community	-427	-2,950, 2,095	0.70
Median housing value ('0000s)	-69	-210, 71	0.30
Median household income ('000s)	-9	-160, 142	> 0.90
# School age children ('00s)	**-642**	**-1,120, -163**	**< 0.01**
% Low-income	473	-146, 1,093	0.13
% New Dwellings (2011-16)	**447**	**119, 775**	**< 0.01**
% Residents	**-259**	**-340, -179**	**< 0.01**
% Move in last year	**-414**	**-825, -2**	**0.05**
% Move in last 5 years	-83	-325, 159	0.50
Eastern Region, against Central	-951	-4,925, 3,024	0.60
Northern Region, against Central	**8,024**	**3,527, 12,521**	**< 0.01**
Western Region, against Central	-199	-3,975, 3,396	> 0.90

Distance to Secondary

Distance to nearest English Public or Catholic Secondary-Level School

Beta = Coefficient of distance (metres)
95% CI = 95% Confidence Interval

Bolded values are statistically significant

N = 733 communities
Akaike Info. Criteria = 16032
Log-Likelihood = -7994
$R^2 = 0.32$

Discussion

- **Housing value and median income**
  - Although it would be expected that both housing value and median income would be higher in communities that have a school present, our study has revealed that this is not the case. The most likely reason for higher housing values and median incomes in communities without schools is that there is a higher proportion of retirement age (or near retirement age) individuals in those communities without schools, while families may be seeking out cheaper communities with schools.

- **New dwelling effect**
  - This can be summarized as the 'chicken and the egg' effect. Although there are a higher percentage of schools where there are new dwellings (and vice-versa) it is not clear which came first. Ontario's system of capital construction for schools may mean that new development brings the land, and expected population, for a new school.

- **Main differences between communities with schools vs. communities without schools**
  - Communities with schools have more private amenities (Bank, Grocery, Variety, Pharmacy, Doctor) and public services (Emergency Services, Library, Community Centre, Public Parks) regardless of population. This indicates that the presence of a school promotes more private (re)investment in the community. In smaller communities and the elementary school level, the number of school age children in a community does not predict having a school.

Data Sources

- DMTI Spatial. (2016). Enhanced Points of Interest. Retrieved from:
  http://geo.scholarsportal.info/#r/details/_uri@=56448532

- Statistics Canada. (2016). Census of Population. Retrieved from Computing in the Humanities and Social Sciences Data Centre at the University of Toronto.

- Statistics Canada. (2016). Designated Places. Catalogue no. 98-301-X