

Association between neighbourhood composition, kindergarten educator-reported distance learning barriers, and return to school concerns during the first wave of the COVID-19 pandemic in Ontario, Canada

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Abstract

Introduction

Research to date has established that the COVID-19 pandemic has not impacted everyone equitably. Whether this inequitable impact was seen educationally with regards to educator reported barriers to distance learning, concerns and mental health is less clear.

Objective

The objective of this study was to explore the association between the neighbourhood composition of the school and kindergarten educator-reported barriers and concerns regarding children's learning during the first wave of COVID-19 related school closures in Ontario, Canada.

Methods

In the spring of 2020, we collected data from Ontario kindergarten educators ($n = 2569$; 74.2% kindergarten teachers, 25.8% early childhood educators; 97.6% female) using an online survey asking them about their experiences and challenges with online learning during the first round of school closures. We linked the educator responses to 2016 Canadian Census variables based on schools' postal codes. Bivariate correlations and Poisson regression analyses were used to determine if there was an association between neighbourhood composition and educator mental health, and the number of barriers and concerns reported by kindergarten educators.

Results

There were no significant findings with educator mental health and school neighbourhood characteristics. Educators who taught at schools in neighbourhoods with lower median income reported a greater number of barriers to online learning (e.g., parents/guardians not submitting assignments/providing updates on their child's learning) and concerns regarding the return to school in the fall of 2020 (e.g., students' readjustment to routines). There were no significant associations with educator reported barriers or concerns and any of the other Census neighbourhood variables (proportion of lone parent families, average household size, proportion of population that do not speak official language, proportion of population that are recent immigrants, or proportion of population ages 0-4).

Conclusions

Overall, our study suggests that the neighbourhood composition of the children's school location did not exacerbate the potential negative learning experiences of kindergarten students and educators during the COVID-19 pandemic, although we did find that educators teaching in schools in lower-SES neighbourhoods reported more barriers to online learning during this time. Taken together, our study suggests that remediation efforts should be focused on individual kindergarten children and their families as opposed to school location.

Keywords

COVID-19 pandemic; kindergarten educators; school closures; school neighbourhood

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Introduction

The COVID-19 pandemic affected people all over the world in unprecedented and multifaceted ways after its declaration in March 2020 (United Nations, 2020). At an individual level, the COVID-19 pandemic had negative impacts on physical, psychological, and emotional well-being and limited social and economic resources [3, 8, 9, 34, 40]. For children more specifically, there were significant effects on education.

According to the United Nations, as of March 2020, 165 countries implemented nationwide school closures, affecting 1.52 billion children and youth, which was over 87% of all enrolled learners [37]. In 2009, schools were closed to mitigate the impacts of the H1N1 pandemic, but this was limited to Hong Kong and some parts of Australia and Canada [7]. 2020 marked the first time schools were closed in such a pervasive manner and for such an extended period of time.

Early data examining educational effects of pandemic-related school closures indicate a drop in the completion of schoolwork, increased dispersion of test scores, increased absenteeism, and children spending considerably less time studying compared to before the pandemic [11, 17]. There are also broader effects, such as increased rates of depression and anxiety [17, 28]. Factors such as fears of infection, insufficient in-person contact with peers and teachers, and a lack of personal space at home may have further amplified the effects of the pandemic-related school closures on children's mental and physical health [43].

During the school closures, many institutions transitioned to distance learning, where educators taught their class through new and often unfamiliar online platforms [17]. Educators identified significant barriers and challenges to distance learning including accessibility and affordability of online resources [31], a lack of sufficient electronic devices at home [24], and their own access to or lack of familiarity with online platforms used for teaching [21]. Educators also identified difficulties accommodating the diverse needs of their students, communicating with parents, accessing electronic devices, and maintaining privacy in the context of distance learning. All of these factors affected young students' abilities to participate and engage in distance learning [36]. In addition, many teachers from kindergarten to Grade 12 had no contact with a significant portion of their students and there is some evidence this differed by income level. For example, in a national survey conducted during the first week of April 2020 in the United States, 56% of teachers working in higher income areas reported interacting with their students at least once a day, compared to 33% in lower-income areas [25].

Online learning posed particularly pointed challenges for kindergarten students and educators, such as modifying the play-based curriculum to online delivery, teaching students who, because of their age, lack independence [36] and evaluating their work. Kindergarten educators reported that their students required parents to be present and provide assistance with tasks, such as logging into the class and uploading their work, and this was not possible for all families [36].

There was significant concern from educators related to establishing a safe environment for in-person learning when there was a return to school in the fall of 2020 [36]. The

most common concerns were the implementation of new hygiene protocols and children's ability to follow them, the adequate provision of emotional and behavioural supports to students, and uncertainties around how much content was learned during the school closures [2, 14, 36].

All of these challenges and concerns may also affect educator mental health. Educators reported increased stress from making sure they provided enough schoolwork to ensure their students did not fall behind and being available for communication with students and their families beyond regular school hours [22, 43]. Many kindergarten educators reported increased depressive and anxiety symptoms that were associated with having to navigate teaching their class from home, while at the same time balancing their home responsibilities, such as the care and learning of their own children [35].

Disproportionate impact of COVID-19

In general, research has shown that the pandemic disproportionately affected disadvantaged and visible minority children. According to Gallagher-Mackay and colleagues (2021), recent immigrants, some visible minorities, and gender-diverse individuals were more likely to report symptoms consistent with moderate or severe psychological distress in comparison to those not belonging to those groups [17]. These groups were also found to be overrepresented among those who were the most vulnerable to COVID-19 infection.

These effects are seen in education as well. Children from lower income families tend to have less access to remote learning tools and the internet [37]. A statewide poll in the United States showed that nearly 50% of low-income families lacked sufficient electronic devices at home to access distance learning [30], which would likely influence the impact of school closures [12]. There is evidence the COVID-19 pandemic-related challenges and school closures have deepened and accelerated inequities in educational outcomes among children [12, 37]. A large-scale study of Grade 3 students in Ohio found that Black students experienced declines in their test scores that were nearly 50% greater than that of White students, and that test scores of financially disadvantaged students decreased more than those of non-disadvantaged students [23].

There is consistent evidence of the influence of geography in addition to individual-level variables on the experience of the pandemic. There is a well-understood association between area-level socioeconomic characteristics and COVID-19 pandemic risk factors and outcomes such as working in front-line employment and infection rates [5, 10, 33, 41]. There is also strong pre-pandemic evidence of an association between area-level socioeconomic characteristics and child development at school entry [15, 44, 45]. Less well understood is whether such associations also exist with school closure-related barriers for learning, concerns about returning to school, and educator mental health.

To address this gap, we conducted a survey of kindergarten educators in Ontario, Canada from May to July 2020, on their perceptions of the impact of the COVID-19-related school closures on distance learning, returning to the classroom, and issues with mental health. A second objective of this study was to examine whether educator responses differ based on the

area of the school where they teach. We hypothesized that educators who taught at schools in more socioeconomically disadvantaged areas would report an increased number of barriers to distance learning, a greater number of concerns regarding the return to school, as well as poorer mental health.

Methods

Study design

The current study was conducted as part of a larger research project entitled “Hidden Future Front Line: Educators’ perspective on the impact of the COVID-19 pandemic on kindergarten children” (HiFLEC) [36]. This was a cross-sectional study of kindergarten educators working in publicly-funded schools in Ontario, Canada. The HiFLEC study comprised a web-based survey that was promoted through the educators’ unions [36], and some additional social media channels from May to July 2020. Some items and scales came from other COVID-19-related surveys (e.g., parent surveys), while the questions related to the students and classrooms were developed in consultation with the educators’ unions. For the current study, we linked these data to neighbourhood composition variables from the 2016 Canadian Census, the most recent pre-pandemic, publicly available Census data.¹ Linkage used the Forward Sortation Area (FSA) (first three digits of the postal code) for the school; there are 513 FSAs in Ontario [39].

Participants and procedure

In the province of Ontario, the kindergarten curriculum is focused on play based, interactive learning. Within each class, there is both a classroom teacher and an early childhood educator (ECE) that work together to foster healthy learning environments. Teachers are responsible for classroom instruction, student learning, and evaluation of student skills, whereas ECEs focus on the promotion of each child’s overall well-being and development [18]. For the current study, study participants were jointly referred to as “educators” and included teachers and ECEs from both English and French speaking institutions in publicly-funded school districts which in Ontario include both Catholic and public-schools. Invitations to complete the study, along with the anonymous survey link, were sent to Ontario educators via e-mail through their union newsletter. Any interested kindergarten educator in Ontario could participate in the study. Respondents represented 73 out of 74 school districts/authorities in Ontario.

To be included in the analysis, respondents had to have a valid response for their role (i.e., kindergarten teacher or ECE) and have completed at least one page of the study survey ($n = 2,569$). All methods and procedures received ethical clearance from the researchers’ institutional ethics board and participation in the study was completely voluntary.

¹The most recent Canadian Census was conducted in May 2021 and was not available at the time of analyses; however it is likely not relevant for the survey data collected in May-July 2020

Outcome variables

Barriers to online learning

Educators were asked to “tell us about the barriers to distance learning you or the students in your classroom and their families may have experienced” and responded on a 5-point Likert scale where 1 = *strongly disagree* and 5 = *strongly agree* (Table 1). These items had a Cronbach’s alpha of 0.75. Total scores, ranging from 10–50, were created by summing the score for each of the barriers and indicate the magnitude of an educator’s agreement with experiencing barriers to online learning.

Concerns regarding the return to school

Educators were asked if they had concerns regarding the return to school in September 2020, and if so were asked to identify that “I am specifically concerned about” from a list of 12 specific concerns (Table 2). These were drawn from existing literature and consultations with the three Ontario elementary teachers’ unions. Respondents were asked to choose all options that applied. These items had a Cronbach’s alpha of 0.76. A sum of the total number of concerns was created.

Teacher mental health

Educators completed two standardized questionnaires of symptoms of depression and anxiety. The Centre for Epidemiological Studies Depression Scale (CESD) [32] is a 10-item questionnaire measuring depressive symptomology in the general population. Participants were asked to rate on a scale from 0 = *rarely or none of the time* to 3 = *most or almost all of the time*, how often over the past week they have felt symptoms associated with depression. For this scale, a score of 16 or higher is used to identify those at risk for clinical depression and a score of 10–15 indicates moderate levels of depression [27]. This scale had a sample-derived reliability (Cronbach’s alpha) of 0.89. The 7-item General Anxiety Disorder Scale (GAD) [38] is a brief measure of anxiety symptoms. Participants were asked to indicate, on a scale from 0 = *not at all* to 3 = *nearly everyday*, how much they have been bothered by various things in the past two weeks. For this scale, scores of 15 or higher represent severe anxiety, 10 to 14 indicates moderate levels of anxiety, 5–9 represents mild levels of anxiety, while scores between 0–4 constitute minimal anxiety [38]. This scale had a reliability of 0.82 in our sample.

Predictor variables

Demographics

Educators reported on both their personal demographics (gender, age bracket, years of experience, marital status), as well as the demographics of their current classroom (e.g., percentage of males and special needs students). Educators also indicated the FSA of their school.

Canadian census variables (2016)

Data on six area-level characteristics came from the 2016 Canadian Census (Table 3). The variables chosen represent

Table 1: Barriers to online learning listed on the HiFLEC survey

The following are barriers to effective teaching in the COVID-19 situation:

1. Students' lack of access to electronic devices
 2. Students' lack of or unreliable internet access at home
 3. Privacy issues with online learning
 4. Diverse student needs (e.g., some students making quicker progress in some areas of learning in comparison to others)
 5. Transferring regular class lesson plans into an electronic delivery
 6. My familiarity/skills with electronic platforms
 7. Internet access in my home
 8. Students' challenge in communicating in English
 9. Parents/guardians not submitting assignments/providing updates on their child's learning
 10. Other barriers
-

Table 2: Concerns about the return to school listed on the HiFLEC survey

"I am specifically concerned about:"

1. Students' readjustment to routines
 2. Students' ability to self-regulate in the school setting
 3. How much students learned during the school closure
 4. Differences in how much students learned during the school closures
 5. Students' ability to keep proper hygiene in class and at school
 6. Students' ability to follow any new protocols, if necessary
 7. Support I might need when we return to school (e.g., support from staff, like educational assistant, language support for English/French learners, mental health support)
 8. Emotional Support for students
 9. Behavioural support for students
 10. Nutritional support for students (e.g., school nutrition/breakfast program)
 11. Children's decrease in physical activity during school closures
 12. Myself or my students contracting COVID-19
-

neighbourhood features that have been shown to be associated with early childhood learning and development [15], as well as with pandemic-related evidence, and suggested by educators themselves [36]. The Census variables were measured at the dissemination area (DA) (small areas generally including 400–700 individuals) and matched to the FSA of the schools in which survey respondents taught.

Analytical strategy

Descriptive statistics including means, proportions, and frequencies were reported to examine educators' responses. Bivariate correlations identified associations between predictor and outcome variables. Based on the bivariate correlations, we conducted Poisson regression analyses for those Census variables that were significantly associated with any of our outcome variables.

We controlled for respondent gender and years of experience in all multivariate analyses. Gender was included because previous research consistently highlights its relationship with traits such as emotionality [26] and reported rates of depression and anxiety [13]. We acknowledge that our sample was comprised predominantly of women. Years of experience was included because pre-pandemic research has indicated that educators who report more years of experience are more likely to report greater self-efficacy [47], and therefore it is possible that educators with less experience may report greater levels

of anxiety or more barriers (See Appendix A for a breakdown of outcome variables by covariates).

In each regression, respondents' gender and years of experience were used as covariates, with each neighbourhood-composition variable as the predictor variable, and the total score on learning barriers or total number of concerns as the outcome variable. All statistical analyses were conducted using SPSS version 26.

Results

Demographics of kindergarten educators and classroom composition

Of the total sample ($n = 2,569$), 74.2% were kindergarten teachers, and 25.8% were ECEs. Almost three quarters of the sample reported being a teacher (72.1%) or ECE (72.0%) for more than 10 years. See Table 4 for breakdown of sample characteristics.

About half (48.9%) of the educators reported that less than 25% of their students' first language was something other than the language of instruction, and most educators (80.4%) reported that fewer than 25% of their students had special educational needs. Additionally, half of the educators reported that less than 25% of the students in their class were recent newcomers to Canada and 24.3% reported that over 50% of their class lived-in single-family homes.

Table 3: List of Canadian census variables included in the study, along with their description

Census variable	Description
1. Proportion of lone parent families	Includes a lone parent of any marital status, with at least one child living in the same dwelling.
2. Median total income	Refers to the total income in 2015 before income taxes and deductions
3. Average Household size	Refers to the number of persons in a private household.
4. No official language (proportion of population that do not speak English or French)	Knowledge of official languages refers to whether the person can conduct a conversation in English only, French only, in both languages or in neither language. For a child who has not yet learned to speak, this includes languages that the child is learning to speak at home.
5. Proportion of population that are recent immigrants (<5y)	Refers to an immigrant who first obtained his or her landed immigrant or permanent resident status between January 1, 2011 and May 10, 2016. 'Immigrant' refers to a person who is, or who has ever been, a landed immigrant or permanent resident. Such a person has been granted the right to live in Canada permanently by immigration authorities. Immigrants who have obtained Canadian citizenship by naturalization are included in this group.
6. Proportion of population Ages 0-4	The percentage of the population that is between the ages of 0 and 4 years of age within a neighbourhood.

Note. Descriptions of Canadian Census variables are from Statistics Canada [39].

Table 4: Sociodemographic characteristics of the study sample

Characteristic	Sample breakdown	
Gender	Male	2.4%
	Female	97.6%
Age bracket	19–25 years old	1.0%
	26–35 years old	17.1%
	36–45 years old	37.8%
	46–55 years old	34.6%
	56 years old and over	8.2%
	Prefer not to answer	1.2%
Marital status	Single	11.4%
	Married	73.5%
	Living common-law	8.0%
	Separated	3.1%
	Divorced	3.5%
	Widowed	0.5%
Living arrangements	Live on my own	7.1%
	Live on my own	79.0%
	Live with child(ren) under the age of 18	61.1%
	Live with adult children	23.8%
	Live with other adult relatives	8.5%
	Live with other adult non-relatives	1.0%
Household income	Between \$21,000-\$40,000	2.1%
	Between \$41,000-\$60,000	5.1%
	Between \$61,000-\$80,000	6.9%
	Between \$81,000-\$10,000	17.3%
	Over \$100,000	44.2%
	Prefer not to answer	23.5%
	Don't know	0.8%

Educator mental health

Of the educators in our study, 2,160 (84.0%) had a valid score for depression and 2,146 (83.5%) had a valid score

for the anxiety scale. Scores on the 30-point depression scale ranged from 0–30 ($M = 11.42$; $SD = 6.74$), and on the 21-point anxiety scale, scores ranged from 0–21 ($M = 6.95$; $SD = 5.65$).

Educator-reported barriers to distance learning

Of the total respondents, 1,135 (44.2%) had a score for barriers to distance learning. Figure 1 displays the number of educators with each score, with a range of 10 (strongly disagreed they experienced any of the barriers to online learning) to -50 (strongly agreed they experienced all the barriers). Of those who responded, the majority of the educators (87.4%) reported a score of 30 or higher ($M = 36.90$; $SD = 6.21$), meaning that on average educators rated each barrier with a 3 or higher.

Educator-reported concerns for the return to school

Almost three quarters (72.0%) of the educators who responded to the question about return to school ($n = 1,982$) reported six or more concerns out of twelve (Figure 2).

Association between the neighbourhood composition, educator mental health, barriers, and concerns

All bivariate correlations between educator mental health, reported learning barriers, and concerns regarding the return to school are displayed in Table 5. There was a small negative association between neighbourhood-level median income and both learning barriers and the total number of concerns reported by educators. There was also a small positive association between proportion of lone parent households in the neighbourhood of the school and the total number of educator concerns. There were no associations between any of the Census variables and educator depression or anxiety. There were, however, significant positive correlations between both educator depression and anxiety and barriers to distance learning and concerns about returning to school.

Barriers to distance learning

Following the correlations, we conducted a Poisson regression analysis to examine the association between neighbourhood median income and barriers to distance learning, while including educator gender and years of experience as covariates. The likelihood ratio chi-square test indicated that the full model was a significant improvement over a null (no predictors) model ($p = 0.003$). Educators who taught at schools in areas with lower median incomes reported a greater number of barriers to distance learning ($p < 0.05$; Table 6).

Concerns for returning to school

A second Poisson regression analysis examined the association between neighbourhood median income and percent of lone parents and educator-reported concerns for the return to school, including educator gender and years of experience as covariates (Table 7). The likelihood ratio chi-square test indicated that the full model was a significant improvement over a null (no predictors) model ($p = 0.02$). We found that educators with fewer years of experience reported a greater number of concerns regarding the return to school ($p < 0.05$). However, none of the SES variables were significantly associated with the number of reported concerns (lone parent families: $p = 0.22$; median total income: $p = 0.35$).

Discussion

In this study of kindergarten educators in Ontario, Canada, we investigated the association between school neighbourhood composition, kindergarten educator reported barriers to distance learning, concerns for returning to the classroom, and their mental health during the first wave of the COVID-19 pandemic. Unique to our study, we focused on educator-reported outcomes in relation to school neighbourhood variables from the 2016 Canadian Census.

Kindergarten educators in areas with a lower median income reported more barriers to distance learning and

Figure 1: Sum of the score of educator-reported barriers to distance learning in kindergarten (N = 1135)

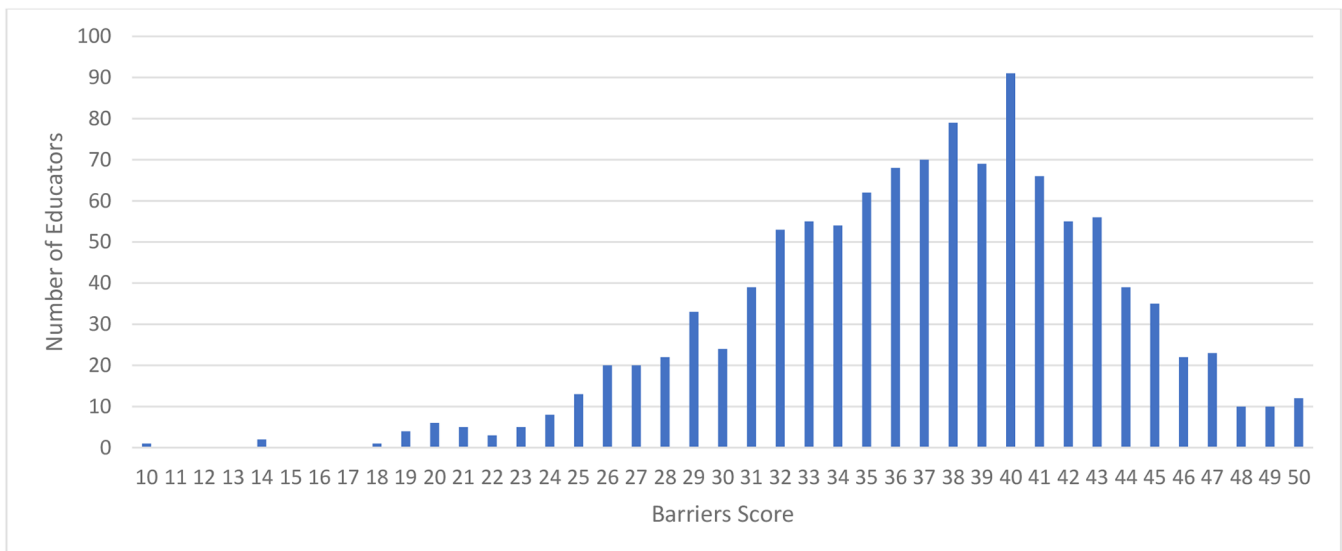


Figure 2: Number of educator-reported concerns regarding the return to school in September 2020 ($n = 1,982$)

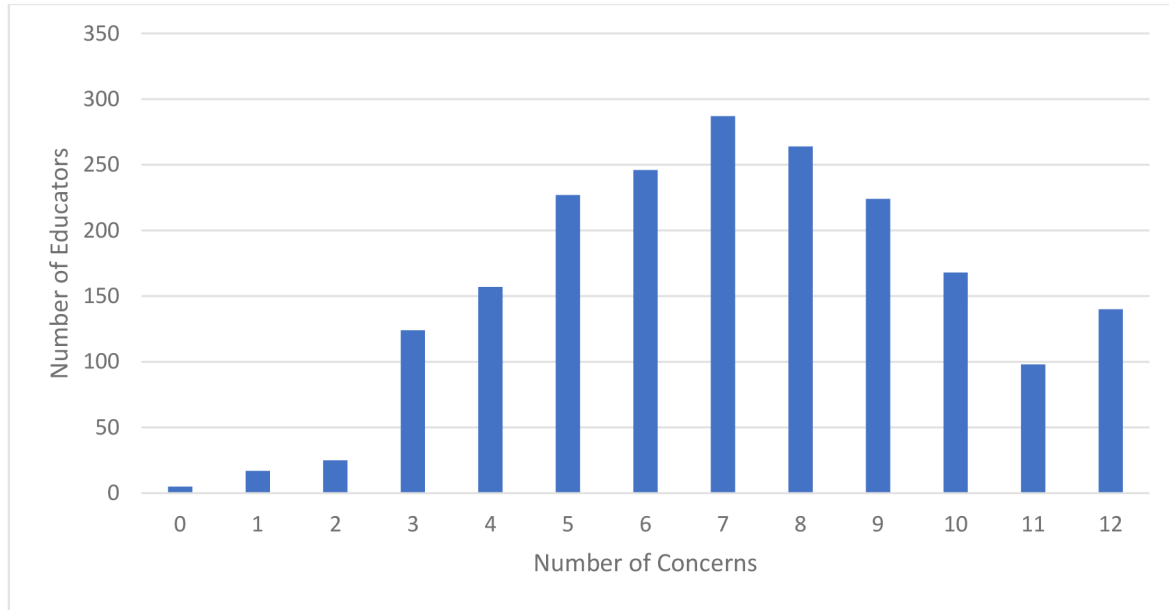


Table 5: Bivariate correlations of all study variables. Shading separates categories of variables (respondent demographics, reported barriers and concerns, educator mental health, school neighbourhood SES)

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Educator gender	—	-0.06**	-0.00	-0.02	-0.03	-0.01	0.02	-0.05*	-0.05*	0.02	0.05*	-0.04
2. Educator experience		—	0.05	-0.06*	-0.04*	-0.06**	0.00	-0.01	0.00	-0.03	-0.04*	-0.06**
3. Barriers			—	0.27**	0.25**	0.22**	0.04	-0.08**	-0.03	0.04	0.02	0.01
4. Concerns				—	0.16**	0.17**	0.06**	-0.06**	-0.01	0.04	0.04	0.00
5. Educator depression					—	0.74**	0.03	-0.03	0.03	0.02	0.01	-0.01
6. Educator anxiety						—	0.04	-0.02	-0.00	0.01	0.01	-0.01
7. Lone parent							—	-0.61**	-0.27**	0.24**	0.33**	-0.07**
8. Median income								—	0.08**	-0.46**	-0.40**	0.15**
9. Household size									—	0.40**	0.35**	0.50**
10. No official language										—	0.70**	0.09**
11. Recent immigrants											—	0.18**
12. Young population												—

Notes. ** $p < 0.01$; * $p < 0.05$. Gender was coded as 1 = female, 2 = male. Experience was coded as 0 = 0–15 years, 1 = 16 or more years.

Table 6: Results of a Poisson regression analysis examining the association between neighbourhood median income and barriers to distance learning ($n = 1,128$)

	B	S.E.	P
Gender	0.01	0.04	0.95
Experience	0.02	0.01	0.05
Median total income	-2.53	8.27	<0.05

Notes. Gender was coded as 1 = female, 2 = male. Experience was coded as 0 = 0-15 years, 1 = 16 or more years.

concerns for the return to school, and educators working at schools in areas with a higher proportion of lone parent households also reported more concerns regarding the return to school. It is possible that schools in neighbourhoods with higher incomes have access to greater academic resources and funding to provide educators with better supports to overcome distance learning barriers [24]. For example, one of the

common barriers reported in the HiFLEC survey was the lack of access to electronic devices [36]. Inconsistent access to high-speed internet and insufficient access to digital technologies has been recognized by others as a barrier to participation in educational activities offered online during the school closures in other Canadian provinces [46]. Schools in higher income neighbourhoods may be more able to supply these devices to

Table 7: Results of the poisson regression analysis examining the percent of lone parent families, median neighbourhood income, and total educator-reported concerns for returning to school (N = 1771)

	B	S.E.	P
Gender	−0.07	0.06	0.28
Experience	−0.04	0.06	0.03
Lone parent families	0.28	0.22	0.22
Median total income	−1.56	1.68	0.36

Notes. Gender was coded as 1 = female, 2 = male. Experience was coded as 0 = 0–15 years, 1 = 16 or more years.

their students, which many school boards across Canada have done [46]. Students from higher SES backgrounds may also have greater access to material resources at home or have living arrangements, such as two-parent households, which are more conducive to promoting learning [42].

Family SES has been found to be a significant predictor of parental involvement in formal and informal learning activities during the pandemic [42]. For example, higher SES families tend to engage to a greater extent in informal homeschooling practices, such as through playing games or engaging in family activities (e.g., nature walk), which indirectly expose students to learning opportunities. On the other hand, households located in lower income areas are less likely to have access to home internet or have multiple internet-enabled devices in comparison to those in the highest income brackets [16], making it more difficult for them to effectively engage in online learning.

Of the six school neighbourhood composition variables included in our study, only the median neighbourhood income was significantly (negatively) associated with educator-reported barriers to distance learning. This lack of significant findings suggests that many of the educational barriers and concerns experienced by kindergarten educators during the first wave of the COVID-19 pandemic may have been relevant for all types of households – not only those that are traditionally disadvantaged. For example, our previous research [36] found that one of the biggest barriers to teaching kindergarten students in Ontario from a distance was the lack of ability to effectively carry out the play-based early learning curriculum, and the inability of the youngest learners to engage in online learning without the help or support of an adult. These barriers are related to the developmental stage of the students and would likely be an issue of concern for all students, regardless of their neighbourhood or family SES.

This ubiquity of the pandemic's impact is likely also the case with the lack of association between educator mental health and any of the school neighbourhood composition variables. Previous research has suggested that school closures during the COVID-19 pandemic negatively impacted the mental health of many teachers [4, 20], and our study adds to this that this was not associated with the type of area their school was located in. Other factors may be more pertinent. For example, Spadafora and colleagues (2022) found that kindergarten educators in Ontario who reported being responsible for the primary care or the learning of their own children, or the care of an older adult, while having to teach from home during the first wave of the pandemic, reported higher levels of depression and anxiety compared to their

counterparts who did not have these responsibilities [35]. The positive correlations between teacher mental health and the number of reported barriers and concerns suggests that these were related to each other, but likely independently of the SES of the neighbourhood of the school, at least during the first wave of the pandemic.

Previous pandemic-related research from the United States has suggested that the COVID-19 pandemic has disproportionately affected those belonging to vulnerable and marginalized groups [6, 19]. Some evidence of such unequal impact of the pandemic also comes from Canada: an Ontario study found overcrowding and food insecurity were reported by racialized communities [1]. Measuring school neighbourhood composition, we found weak evidence of area-level SES association with educators reports of barriers to learning and concerns about returning to in-person learning for the youngest learners. These results seem to suggest that neighbourhood level factors were not exacerbating the individual-level experiences of the youngest learners.

Strengths, limitations, and future direction

A major strength of our study was the unique ability to link teacher-reported variables to Census variables using school FSA. This allowed us to examine the potential association (or lack thereof) of school area level demographics and educator reported barriers, concerns, and mental health, due to the COVID-19 pandemic school shutdowns. As a result, our study was able to highlight that it might be more important for supports to be focused on individual educators and students, as opposed to schools.

It is possible that the associations with student-level variables may have been different if we had used a composite SES index based on areas where the students lived, rather than the school they attended, and with educator mental health if we had used the neighbourhood where they lived. However, some analyses indicate that Census-based SES indicators of school neighbourhoods are very similar to those based on postal codes of individual students attending kindergarten [29]. In addition, our study was not designed to collect individual student data. It also remains possible that having data at a more nuanced level (i.e., the family SES rather than an area-level estimate) would have yielded different results. Our data were educator reported and did not measure the direct educational or developmental impacts of the pandemic on kindergarten children. Future research should directly assess the potential impact on student outcomes (e.g., comparisons of academic achievements or developmental outcomes).

Future studies should also continue to examine these associations during different time points of the pandemic, and with the new waves of Census data.

Another potential limitation of the current study is the generalizability of the findings as this study was conducted in a single province in Canada. These results may not be generalizable to other provinces, territories, or countries, considering the variability in kindergarten curricula across jurisdictions, as well as differing COVID-19-related public health mandates and guidelines. Future research should also examine these associations in older grades, as it is possible that the associations may be different (potentially more pronounced) in other educational contexts.

Implications and conclusion

Inequities in educational outcomes have been highlighted since the onset of the pandemic, pointing to the importance of investigating factors that most contribute to this [17]. The combination of survey and census data in our study allowed us to explore the potential association between educator-reported aspects of teaching remotely during the first wave of the pandemic and the composition of school neighbourhoods. In general, educators teaching in schools located in neighbourhoods with lower incomes experienced more barriers to online learning, but no associations were found between neighbourhood composition variables and concerns about returning to school or symptoms of depression and anxiety in educators. These findings suggest that the impacts of the pandemic on kindergarteners' learning environments were not necessarily related to differences in school neighbourhood composition, e.g., of people with low income, immigrant families, or families with young children. While there has been strong evidence in previous research that individual-level characteristics negatively impacted individual experiences during the COVID-19 pandemic shutdowns, our study suggests that the neighbourhood composition of children's school location did not exacerbate this. Our results highlight that while supports and remediation of the impacts of the COVID-19 pandemic should still be targeted to less affluent neighbourhoods first, policies for remediation should focus on individual kindergarten children and their families as opposed to locations (i.e., their school).

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Conflict of interest statement

The authors have no potential conflicts of interest to declare.

Ethics statement

This study has obtained ethical approval by the Hamilton Integrated Research Ethics Board (#10955). Informed consent was obtained from all individual participants included in the study.

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Appendix A

Appendix Table 1: Educator-reported barriers, concerns, and symptoms of anxiety and depression by gender and years of experience

Outcome variable	Covariate	
	Gender	
	Male	Female
Barriers	37.00 (5.97)	37.08 (6.16)
Concerns	6.84 (2.63)	7.23 (2.60)
Anxiety	6.66 (5.87)	7.04 (5.61)
Depression	10.00 (6.73)	11.52 (6.74)
	Years of Experience	
	0-15 years	16 years or more
Barriers	36.57 (6.12)	37.25 (6.28)
Concerns	7.34 (2.63)	7.05 (2.62)
Anxiety	7.28 (5.65)	6.61 (5.64)
Depression	11.72 (6.47)	11.15 (6.98)

