

RESEARCH ARTICLE

Impact of COVID-19 Public Health Protocols on Teachers Instructing Children and Adolescents During an In-Person Simulation

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Abstract

Objective: As a result of the COVID-19 pandemic, public health agencies and school boards across Canada enacted new protocols, including face masks, physical distancing and enhanced hygiene, to support the safe reopening of in-person school. This study explored the experiences and perceptions of teachers instructing children and adolescents in person during a two-day school simulation. **Method:** This study was part of a large school simulation exercise conducted in Toronto, Ontario. Kindergarten to grade 12 teachers taught in classrooms with either masked students, or students who were un-masked or only masked when physical distancing was not possible. A qualitative descriptive phenomenology approach was utilized, and data were collected via virtual focus groups. Qualitative data analysis involved multiple rounds of inductive coding to generate themes. **Results:** The sample included 14 teachers (92.9% female; 85.7% White), with a median of 9.5 years teaching experience. Three primary themes emerged: 1) *learning to navigate public health measures*, 2) *needing to adapt teaching strategies* and 3) *striving to manage conflicting priorities*. The majority of teachers reported that mask-wearing and physical distancing impacted their classroom teaching, communication and connection

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with students. **Conclusions:** As schools transition to in-person instruction, teachers will be required to play dual roles in education and public health, with implications on safety, teaching and professional identity. Public health agencies and school boards are encouraged to engage teachers in ongoing conversations regarding in-person school planning and operations. Furthermore, evidence-based interventions, including increased teaching development programs, are recommended to support teachers during the COVID-19 pandemic.

Key Words: public health, COVID-19, qualitative research, infectious diseases, teachers, schools

Résumé

Objectif: Conséquemment à la pandémie de la COVID-19, les organismes de santé publique et les conseils scolaires de tout le Canada ont mis en œuvre de nouveaux protocoles, notamment des masques, une distanciation physique et une hygiène accrue, afin de soutenir la réouverture prudente de l'école en personne. La présente étude a exploré les expériences et les perceptions des professeurs instruisant les enfants et les adolescents en personne durant une simulation scolaire de deux jours. **Méthode:** La présente étude faisait partie d'un grand exercice de simulation scolaire mené à Toronto, Ontario. Les professeurs de la maternelle à la 12^e année enseignaient dans des classes où les élèves étaient soit masqués, soit non masqués, soit seulement masqués quand la distanciation physique n'était pas possible. Une approche de phénoménologie qualitative descriptive a été utilisée, et les données ont été recueillies par des groupes de discussion virtuels. L'analyse des données qualitatives impliquait de multiples rondes de codage inductif pour générer des thèmes. **Résultats:** L'échantillon comportait 14 professeurs (92,9 % de sexe féminin; 85,7 % Blancs), avec une moyenne de 9,5 années d'expérience d'enseignement. Trois principaux thèmes ont émergé : 1) *apprendre à naviguer les mesures de santé publique*, 2) *la nécessité d'adapter les stratégies d'enseignement* et 3) *s'efforcer de gérer les priorités conflictuelles*. La majorité des professeurs a déclaré que le port du masque et la distanciation physique influençaient sur leur enseignement en classe, sur la communication et la connexion avec les élèves. **Conclusions:** Tandis que les écoles font la transition à l'enseignement en personne, les professeurs devront assumer des doubles rôles en éducation et en santé publique, impliquant la sécurité, l'enseignement et l'identité professionnelle. Les organismes de santé publique et les conseils scolaires sont invités à faire participer les professeurs à des conversations actuelles relativement à la planification et aux activités de l'école en personne. En outre, les interventions fondées sur des données probantes, notamment les programmes accrus de développement de l'enseignement, sont recommandées pour soutenir les professeurs durant la pandémie de la COVID-19.

Mots clés : santé publique, COVID-19, recherche qualitative, maladies infectieuses, professeurs, écoles

Trial registration: "Back to School COVID-19 Simulation Study"; #NCT04531254; <https://clinicaltrials.gov/ct2/show/NCT04531254>

Introduction

In April 2020, over 138 countries closed schools in response to the COVID-19 pandemic, resulting in major disruptions to education and impacting more than 80% of children worldwide (1). Teachers and school boards adapted to these unprecedented disruptions, developing multiple models of education, including online learning for children and adolescents who could not attend in-person school. Following the first wave of the pandemic in Canada, child and adolescent health experts advocated for school reopening to facilitate social development, improved physical and mental health outcomes and greater access to educational support systems (2-5). Indeed, school closures have resulted in a plethora of negative consequences on children and adolescents that extend beyond the classroom (6), including greater social isolation and loneliness (7), increased stress and deterioration of mental health (7-10).

School closures have also challenged teachers, who were required to adapt to uncertain teaching environments.

Teachers participating in online teaching have reported heightened anxiety from increased workloads (11), unpreparedness with information and communication technologies (12), concerns about educational inequities, such as lack of internet access for disadvantaged students (13), and a disconnect from students and colleagues (14). In a longitudinal survey about the impacts of online teaching on Canadian teachers' perception of change, efficacy and burnout, Sokal et al. reported that while teachers (n=1,626) became more efficacious for managing students' online behaviour, they also experienced increased stress, exhaustion and cynicism (15).

Given that teachers' working environments are students' learning environments (16), the wellbeing of teachers cannot be separated from the wellbeing of children and adolescents. Indeed, the most significant factor affecting student achievement is the quality of the teacher, which is in turn, influenced by their environment and wellbeing (17, 18). The Canadian Teachers' Federation has recognized that pandemic recovery and school reopening should prioritize

the mental health and wellbeing of both students and teachers (19). Ahead of school reopening, Canadian public health agencies and school boards implemented health and safety protocols, such as masks, physical distancing and enhanced hand hygiene measures for teachers, students and staff (20, 21).

While most of the school reopening discourse has focused on increasing learning time and technology use to compensate for the learning loss from online school (22), less attention has been paid to the short- and long-term impacts of returning to school on teachers and teaching. In Manitoba, the CBC Teacher Survey (n=833) found that almost 85% of teachers were worried they would contract COVID-19 in person (23). In the Canadian Teachers' Federation survey (n=15,024), 84% of teachers reported having concerns about returning to school buildings and reintegrating to face-to-face classrooms, with the top concern being health and safety (e.g., vaccine, personal protective equipment, sanitation) (24). Across Canada, teachers also reported feeling unappreciated by governments as they were not deemed a priority group during the first phases of vaccination, despite calls for their recognition as essential workers (25).

Given the dramatic changes in the delivery of education, understanding the impacts of school reopening and public health protocols on teachers' mental health, motivation and ability to teach are essential to ensuring teachers' wellbeing, a positive learning environment for children and adolescents and the achievement of educational milestones. This study explored the experiences and perceptions of teachers instructing children and adolescents in person during a two-day school simulation exercise. Findings identify key areas for targeted strategies to support teachers as they navigate the complexities of school reopening during the COVID-19 pandemic.

Methods

Study setting and design: This study was part of the larger Hospital for Sick Children (SickKids) "safe school simulation" study, a two-day, in-person simulation conducted in August 2020 in Toronto, Canada. The simulation study aimed to evaluate the impact of planned public health protocols on teachers and students to inform school reopening during the COVID-19 pandemic (www.safeschoolco-vid19.ca; "Back to School COVID-19 Simulation Study"; #NCT04531254). The simulation involved two full days of school with English-language curricula. There were two types of classrooms for each split-grade class (i.e., junior-senior kindergarten, grades 1-2, grades 3-4 and so on up until grades 11-12) for a total of 14 classrooms. Each teacher was randomly assigned to instruct in a classroom

where students were told (i) to wear a mask at all times, or (ii) that masks were not required (grades 3-4 and below) or only required when they could not maintain physical distance (grades 5-6 and above). Classrooms were designed with desks spaced at least two meters apart. A total of 183 students participated in the simulation exercise with a maximum of 15 students per class. All teachers wore face masks regardless of their classroom assignment.

The current study explored the experiences and perceptions of all teachers who participated in the simulation. A qualitative approach was used to enable participants to share in-depth and nuanced responses from their perspectives (26). Accordingly, descriptive phenomenology, an inductive qualitative research tradition, was chosen to systematically inquire into participants' conscious and subjective experiences and the meaning-making activities related to their experience (e.g., teaching in person) (27). In the moment of conscious recall, participants implicitly describe the meaning behind their experiences to embody the essence of the phenomenon. This approach aligns well with our objective, which is aimed to explore and describe teachers' lived experiences and perceptions with public health protocols and in-person teaching during the simulation study.

Sample: Participants in this study comprised of all 14 teachers who participated in the larger SickKids simulation study. Teachers were included in the larger study if they were certified teachers and provided informed consent to participate. Teachers were excluded if they: (i) had tested positive for COVID-19 in the 14 days before the simulation exercise, (ii) were experiencing signs and symptoms of COVID-19 before the simulation exercise, (iii) had been exposed to an individual who tested positive for COVID-19 in the 14 days before the simulation exercise, (iv) had travelled outside of Canada in the 14 days before the simulation exercise, or (v) had a known hypersensitivity or allergy to Fluorescein dye/GloGerm (a biological indicator applied to the hands, mask or nose to simulate potential asymptomatic infection of COVID-19).

All teachers were recruited from Public, Private/Independent and Catholic school boards across the Greater Toronto Area (GTA). Teachers were identified and approached by email communication from the principals of the schools involved in the study or via community notices. Interested teachers were directed to a website (<https://safeschoolco-vid19.ca>) and then webinars containing study information. Following the webinars, teachers were given an online form to indicate their willingness to participate in the study. They were subsequently contacted by a research team member to complete study eligibility screening and to provide informed written consent. Teachers were recruited utilizing

convenience sampling, stratified according to teachable grades. Twenty-three consent discussions took place in order to recruit the 14 teachers required to instruct the split-grade classes of the simulation study. Before the simulation exercise, an information package was distributed to teachers containing information about COVID-19 testing (i.e., procedure, location, what happens if the test is positive), logistics for the simulation (i.e., arrival and departure times, what to bring) and general safety information about hand hygiene and masking. Recruitment was closed once a sufficient number of teachers were recruited.

Data collection: Upon participant recruitment, a sociodemographic questionnaire was administered and included questions pertaining to age, sex, race, teaching experience, school board and type, school location and expected teaching assignment in the fall. In-depth, semi-structured focus groups were conducted virtually via Microsoft Teams on the last day of the simulation study. Focus groups effectively yield in-depth data from several participants simultaneously and capitalize on communication between participants to generate data as part of the method (28, 29). As teaching is a collaborative profession, we believed that focus group processes could encourage synergy between participants as they talk and comment on each other's experiences and points of view. These group processes can produce richer and more authentic data than individual responses. In addition, focus groups are particularly suited to studying lived experiences and perceptions and how these processes are constructed (28, 29).

Two focus groups, with seven participants per focus group, were facilitated by two co-moderators trained in qualitative methodologies. A focus group script was prepared based on the research teams' clinical and qualitative expertise and consisted of open-ended questions to promote rich, descriptive and synergistic responses (29). Focus groups began with a general inquiry about participants' initial feelings about participating in the simulation exercise (e.g., How were you feeling about coming to the classroom and teaching today?). Participants were then asked to describe their experience with masks, physical distancing and teaching (e.g., What was it like wearing / not wearing a mask today?; What did you notice about your interactions with students and the way they interacted with each other?; What was it like teaching today?). Finally, participants shared their thoughts about school reopening (e.g., How do you feel about returning to school and teaching in September 2020?). Focus groups lasted approximately 90 minutes to allow prolonged engagement with participant perspectives (29). The co-moderators made detailed field notes and debriefed following each focus group. Focus groups were audio-recorded, transcribed verbatim and de-identified.

Data analysis: Descriptive statistics were calculated for relevant participant sociodemographic data. Qualitative descriptive phenomenological analysis followed Colaizzi's method, and involved multiple rounds of inductive coding to identify emergent themes (27, 30). Two researchers conducted an initial round of coding by identifying "significant statements" within the transcripts to represent key ideas or meaningful concepts (26, 30). An initial codebook was prepared, and team process meetings allowed the research team to critically link codes to form patterns of similarities and differences. Preliminary themes were identified and existing codes were reviewed and refined through an iterative and reflexive process (31-33). While additional focus groups were not possible due to recruitment limitations, themes represented a rich understanding of participants' shared experiences and perceptions teaching in person during the simulation exercise. Further, research indicates that two focus groups can be sufficient to identify the most prevalent themes relating to a phenomenon (34, 35).

To enhance trustworthiness, the research team employed the following measures: pilot-testing the focus group script, critical reflexivity of preconceived notions and biases towards school reopening, prolonged engagement with the data and peer debriefing (27, 36). Preliminary results were presented and discussed with six educators (from the SickKids Child and Family Centred Care Centre and the Toronto District School Board) to support data interpretation and trustworthiness (27, 30, 36). NVivo 12 was used for qualitative data management and analysis (37).

Ethics approval: This study was approved by the SickKids Research Ethics Board and registered on ClinicalTrials.gov. All participants provided written informed consent prior to study commencement.

Results

Participant demographics are displayed in Table 1. Three primary themes were identified: learning to navigate public health measures, needing to adapt teaching strategies and striving to manage competing priorities. Illustrative quotes are presented in Table 2. Quotes have not been attributed to a particular participant to ensure confidentiality.

1. Learning to Navigate Public Health Measures

A sense of excitement and nervousness was present as teachers discussed their initial feelings about participating in the simulation exercise. Many teachers were excited about the opportunity to return to the classroom and interact face-to-face with students, with some describing curiosity about the planned public health protocols: "I was excited

Table 1. Frequency Distribution of Participant Demographics

Variable	% (n)
Age (years)	
< 30	21.4 (3)
31-40	35.7 (5)
41-50	28.6 (4)
51-60	14.3 (2)
Sex	
Female	92.9 (13)
Male	7.1 (1)
Race	
East Asian	7.1 (1)
South East Asian	7.1 (1)
European White	42.9 (6)
North American White	42.9 (6)
School board	
Private / Independent	71.4 (10)
Public	14.3 (2)
Catholic	14.3 (2)
School type	
Junior (K-5)	50.0 (7)
Middle (grades 6-8)	21.4 (3)
High (grades 9-12)	28.6 (4)
School location	
Toronto	57.1 (8)
GTA (excluding Toronto)	42.9 (6)
Teaching location in September	
In-person	92.9 (13)
Online	7.1 (1)
	Median (SD)
	[min, max]
Teaching experience (years)	9.5 (9.0) [2, 29]

because I missed being in front of students. I was very curious to see how I would react... around all these protocols.” During the two-day simulation, all teachers were required to wear a face mask while in the classroom. Half the teachers taught to masked students and the other half taught to students who were un-masked or only required to wear a mask when physical distancing was not possible. While some teachers described mask-wearing as “almost unbearable”, others noted that they felt safer wearing a mask and that “you get used to it” by the end of the day.

With respect to students following public health measures, teachers noted that age and grade seemed to impact students’ adherence. Teachers of younger grades (grades K-4) spoke about the challenges associated with monitoring students’

mask-wearing, physical distancing and hand hygiene. For example, one Kindergarten teacher expressed: “I replaced one boy’s mask 12 times today... In the two days I had a box of 50 and I went through 36 masks within the 11 children that I had.” Conversely, teachers of older grades (grades 5-12) reported varied responses to their students following public health protocols. For some older students, efforts to follow protocols waned: “If I had to remind [students] every time, that’s all I would every say.” However, other older students successfully self-regulated: “[Students] knew to wash their hands before everything. The masks were not a problem,” allowing teachers to continue focusing on their teaching responsibilities.

As teachers navigated public health protocols, many were surprised to observe how well students interacted with each other and built relationships. One teacher described: “I was surprised to see how well these kids gelled... the masks didn’t seem to get in the way of them getting along, playing together.” This sense of normalcy in student-student interactions, despite protocols, evoked feelings of familiarity for teachers of their role and routine. This led many teachers to re-oriented their initial concerns: “Within a few minutes, I felt like I was getting right back into what I always do... And that brought me back to what it feels like to be a teacher... I felt like I was ‘at home’ very quickly.”

2. Needing to Adapt Teaching Strategies

As discussions moved to teaching and pedagogy, teachers quickly noted the impact of public health protocols on their teaching style and classroom environment. The planned physical distancing measures in the classroom required desks to be spaced at least two metres apart to prevent students from gathering in groups. One teacher reflected upon how foreign these measures felt: “I’ve never taught without tables like where kids are working and facing each other and so to stand in front of a room that has 15 separate desks... to me was completely foreign.” This required teachers to adapt existing teaching strategies to support greater physical distancing among students: “Everything I went to do yesterday, I had to stop and be like, ‘this is how I would do it, but I can’t do it this way... I’m going to have to do it [another way].” One teacher described her use of the Socratic method, which involved standing in front of the classroom to lecture: “I felt uncomfortable ‘cause that was not my teaching style. I like to do a lot of inquiry, a lot of manipulatives”.

Many teachers opted against including group activities in their lessons as they “felt nervous about doing any collaborative group work”. For the teachers who did incorporate group activities, they experienced barriers, such as longer transition times that took up more class time. This

Table 2. Qualitative Themes, Sub-themes and Illustrative Quotes

Theme	Sub-theme	Quotes
Learning to navigate public health measures	Excitement	<ul style="list-style-type: none"> • “I was excited because I missed being in front of students. I was very curious to see how I would react...around all these protocols and of course see how [students] would react.” • “I was excited to go back to experience – get an idea of what it would be like in September.”
	Experience wearing masks	<ul style="list-style-type: none"> • “I would forget that I was wearing [a mask], you know, until my nose itched or something. But then, by the end of the very last hour of the day, it started to become almost unbearable, and I was considering like maybe I can go stand in the hall and like and just take a breath of not super-hot air. So as the day went longer, I found it harder and harder and harder... I didn't get to drink water like I normally would and I was very dehydrated after.” • “You get used to [wearing a mask]. By the end of today...I almost forgot about it but at the beginning of yesterday, it was like driving me crazy.” • “Knowing that I was going to have a mask on the whole time was comforting.” • “I was happy to hear that we were masked – I was – because my dad is very high risk.”
	Students' adherence with public health measures	<ul style="list-style-type: none"> • “I replaced one boy's mask 12 times today...In the two days I had a box of 50 and I went through 36 masks within the 11 children that I had.” • “Lining up, washing their hands – the washroom was a party. Washing our hands, it, it wasn't, it wasn't happening like it should have been.” • “Social distancing doesn't actually work for kindergarten. Moreover, as a teacher, I don't want to do that. I'm not going to social distance with them because they really need me to be that close to them, at the very least, even with a mask on.” • “I taught...older kids and they were unmasked at their desks...The rule was, and this was like the class rule, if they got up from their desks, they were supposed to put their mask on. Now, in the beginning that happened, but I noticed towards the end of the day...Now I didn't want to remind them too much because I wanted to see what they would do normally. Besides, if I had to remind them every time, that's all I would ever say.” • “It very quickly became routine. [Students] knew to wash their hands before everything. The masks were not a problem. So watching children's behavior and how they reacted, definitely was comforting...And also like, there were times where my kids didn't follow the rules and it wasn't like so dramatic. Like it was kind of just like, I reminded them, ‘Oh, don't forget to put your mask on if you leave your desk’ and it was like a casual, not ‘big deal’ thing.”
	Student-student interactions	<ul style="list-style-type: none"> • “I was surprised to see how well these kids gelled in two days and they didn't, the masks didn't seem to get in the way of them getting along, playing together.” • “It's surprising and...[students] are just naturally the way they are, they're curious and social. It still surprised me that with all those protocols – like pleasantly surprising – and the very positive aspect of, well, this is a bad thing. They enjoyed playing with one another.” • “Within a few minutes, I felt like I was getting right back into what I always do...And that brought me back to what it feels like to be a teacher, and that's looking out at a sea of faces and being able to read their faces. So, for that it felt, I felt like I was ‘at home’ very quickly.” • “I was like also nervous at first and then seeing how easy the kids were easily interacting and it kind of just started feeling normal.”
Needing to adapt teaching strategies	Changes in teaching style	<ul style="list-style-type: none"> • “I couldn't teach the way that I teach...I've never taught without a carpet space, I've never taught without tables like where kids are working and facing each other and so to stand in front of a room that has 15 separate desks without a carpet was...to me was completely foreign.” • “Everything I went to do yesterday, I had to like stop and be like, this is how I would do it, but I can't do it this way so I'm going to have to do it.” • “The first day was completely Socratic and I felt uncomfortable 'cause that was not my teaching style. I like to do a lot of inquiry, a lot of manipulatives and I felt that it just didn't feel right for me as...as the teaching style that I prefer.”

continued

Table 2. continued

Theme	Sub-theme	Quotes
	Navigating collaborative work	<ul style="list-style-type: none"> • “My teaching style I felt, got a little compromised because I felt nervous about doing any collaborative group work.” • “[Conference marking] is a teaching tool and I just didn’t want to do that because I didn’t want [students] to be switching papers and therefore transmitting, you know, bacteria from each other that way...So that felt limiting.” • “When I did try to create activities where they were collaborating with each other, I would just say ‘Okay, you can work in like twos’ or ‘You can work in threes’, but I wouldn’t really say move next to each other and I found they would move, like, basically like some of them were on top of each other like clinging arms.” • “Transition time – the time it took to transition from one activity to another almost felt like twice, or even three times long because they had to do it individually...For them to come up individually to do that just took...like 20 or 30 minutes, when it should have been maybe a 10-minute activity.”
	Impacted communication and relationship building	<ul style="list-style-type: none"> • “What I found super hard was hearing them. So, my group had masks on. I had to go right up to some kids and ask them to repeat something, several times, to actually be able to understand what they were saying, especially, like, the quieter students...And then I felt annoying, asking them to repeat themselves so many times.” • “Hearing me and just reading the room was really difficult. Like when I would ask them things, I couldn’t tell if...a lot of them don’t just like answer you. They would just – I find that usually they smile at you more, to give you a response, but like I couldn’t see it. So it was like, sometimes, it was just hard to like figure out what they thought, and it was little hard to hear them from afar.” • “I felt all this energy I had to put forward just to be understood...Without my face I felt like...I was doing a dance in front of the class all day.” • “I would like ‘Oh yes. Stop. Move.’ Like I’m considering this from a school of 900 kids where we have 60-plus staff members, like, like it’s gonna be...a lot (short laugh). (Deep breath). And it’s gonna affect our relationships and the way that kids see us interacting with each other.. I mean, it’s either gonna be a positive way because we are going to demonstrate what social distancing looks like...but at the same time when you’re a community of a school, having to be really far away from each other is going to affect the climate of the school in general.”
Striving to manage competing priorities	Multiple responsibilities	<ul style="list-style-type: none"> • “The purpose of us going back need[s] to be made really clear. Are we going back to promote a positive mental health for our students to provide them a safe space for them to grow, rebuild relationships, to teach them about health, wellbeing. Or, are we going back to fill the academic gaps that took place over the 6 months...I don’t think it’s feasible to try to do both.” • “We spen[t] half our day cleaning and half our day taking kids to wash their hands and making sure they’re sanitized and putting on their masks and like, what are the most important things for us to be doing. Is it most important that our kids are wearing a mask and that’s where we should put our energy? Or is it most important that we’re cleaning the desks all the time and that’s where we should put our energy?” • “I don’t get to be me when there’s COVID-19...We can’t be those warm friendly people that most teachers are...That really impact[s] the way I can be as a person and as a teacher who has that relationship with my kids. Now my kids seemed to really enjoy what we did, and I was my bubbly personality that I can be, but it wasn’t the same...and I miss that in my social life, as well as in my professional life.”
	Prioritizing health by focusing on hygiene	<ul style="list-style-type: none"> • “There was more time spent on what have you touched and is it clean than did you understand what the lesson was. Because it was more important to keep [students] safe than make sure they understood.” • “The amount of cleaning that I had to do...For kinderarten – but like I follow those rules as best as I can for cleaning and I didn’t realize how time consuming it was. I really felt like I didn’t teach.” • “They were sharing everything by the end of that and I was like, I, I just felt like a really terrible teacher. I felt like I put kids at risk. I felt badly about myself.”

continued

Table 2. continued

Theme	Sub-theme	Quotes
	Concerns about teaching calibre	<ul style="list-style-type: none"> • “Every time I picked up a kid’s pencil while I was teaching or even their paper, I felt like, shoot there I did it again, I’m touching something somebody else touched. It was extremely stressful and I found it really sad.” • “There’s this, like balance of ‘I’m so excited to be around kids’ but at the same time I have to protect myself and I have to protect my family and those kids need to be protected and their families too. So, where’s the line?” • “When I think of it, I don’t know how I’m gonna make this work, so I agree. I am less nervous about the actual health part of it, ‘cause I got like comfortable, but I feel nervous about how I’m gonna effectively teach.” • “My school...[is] ambitiously pursuing their pre-pandemic vision for the school. Part of the goal is not to hopefully deliver teaching and a learning environment that might match pre-COVID days, but it will be better, and we will deliver an ‘exceptional learning program’. While they say health, safety and wellbeing is at the forefront, a lot of material and work has been put forth to us...to prepare for the year academically, but nothing has been done [or] mentioned about our mental wellbeing. It has not even been asked, never mind addressed, about what our concerns are ... This extremely adds to my anxiety.”
	Optimism and confidence for school reopening	<ul style="list-style-type: none"> • “I overheard in the hall, how [students] were so happy to be with other kids...I know that’s something that has been really reiterated as like a positive for going back to school, but I really saw it. How really happy they were and like they were exchanging phone numbers and all this stuff.” • “It kind of made me optimistic about...even more optimistic about going back [to school], knowing that it’s going to be good for them. It’s going to make them happy.” • “For me, it was just such a reminder of how much I miss kids in the classroom. And it makes me want to go back, but very safely.” • “At the end of the two days I felt...I felt good, I felt confident. I felt like I could go back and implement some of these things in my classroom.” • “It’s obviously not perfect, but like it’s possible. I could not wrap my head around how this was going to be possible, but now I can see that...But obviously, as mentioned, when schools are bigger and there’s more kids, it’s still a little scary but it does make me more hopeful in that way.”

was described by one teacher who asked students to draw Rutherford diagrams on the blackboard: “*The time it took to transition from one activity to another almost felt like twice or even three times long because they had to do it individually.*”

Teachers also spoke about the compounded effects of face masks and physical distancing on communication with students in the classroom and their colleagues. In this context, masks were not only a physical barrier muffling voices, but also a social barrier concealing facial expressions, emotions and meaning. Several teachers reflected upon the challenges of communicating class material while wearing a mask: “*Hearing me and just reading the room was really difficult*”; “*Without my face I felt like... I was doing a dance in front of the class all day.*” Physical distancing also demanded students and teachers to speak louder to hear each other. One teacher noted the potential impact of physical distancing on relationship building and the school

community: “*When you’re a community of a school, having to be really far away from each other is going to affect... our relationships and the way kids see us interacting with each other... the climate of the school in general.*”

3. Striving to Manage Competing Priorities

With public health protocols and adapted teaching styles came additional roles and responsibilities for teachers that led to questions about their professional role and identity. Many teachers reported feeling pulled in multiple directions with competing priorities and unclear instructions from leadership: “*Are we going back to... promote a positive mental health for our students... to teach them about health, wellbeing. Or are we going back to fill the academic gap... I don’t think it’s feasible to try to do both.*” Teachers, especially those who taught younger grades (grades K-4), spoke about prioritizing students’ health by focusing on mask-wearing, physical distancing and hygiene. However, maintaining public health protocols often eroded into their

teaching time: *“We spen[t] half our day cleaning and half our day taking kids to wash their hands... what are the most important things for us to be doing?”* Teacher narratives also reported feelings of guilt and role failure for students’ shortcomings in following public health protocols: *“[Students] were sharing everything by the end... and I was like, I, I just felt like a really terrible teacher. I felt like I put kids at risk. I felt badly about myself.”*

Other teachers worried about the external pressures from parents and school administration to maintain a similar teaching calibre within their classrooms as to pre-pandemic times. These concerns led to questions about the sustainability of school reopening, along with worries about their own mental and physical health and wellbeing: *“A lot of material and work has been put forth to us... to prepare for the year academically, but nothing has been done [or] mentioned about our mental wellbeing.”*

Despite the competing priorities, the majority of teachers acknowledged the in-person simulation exercise as a positive experience for themselves and their students. Specifically, 10 of 14 teachers agreed that returning to the classroom improved their mental wellbeing during the focus groups. In particular, seeing student-student interactions reminded many teachers of the benefits of in-person learning beyond the academic classroom: *“I overheard in the hall, how they were so happy to be with other kids... I know that’s something that has been really reiterated as like a positive for going back to school, but I really saw it.”* Witnessing students’ abilities to adapt to changing school environments encouraged teachers’ optimism and confidence about returning to in-person school during the COVID-19 pandemic: *“It does make me more hopeful.”*

Discussion

This study described the experiences and perceptions of teachers instructing child and adolescent students in person during a two-day school simulation exercise. Teachers’ narratives illuminated three key areas of concern for school reopening: navigating public health protocols, adapting teaching strategies and managing competing priorities. Importantly, the majority of teachers reported that mask-wearing and physical distancing impacted their teaching, communication and connection with students, validating some of the concerns that parents and educators have expressed across Canada (38-40). Teachers also reported difficulties in ensuring younger students follow public health protocols and experienced competing priorities in the classroom. Nonetheless, teachers recognized the importance of student-student interactions, which made it worthwhile to return to in-person school.

According to current public health guidelines, face masks and physical distancing are among the best practices to reduce viral transmission (41). In the present study, while some teachers found masks to be uncomfortable, others reported that they adapted and felt safer wearing a mask. As well, many teachers observed their students interacting and forming relationships despite wearing masks. This suggests that face coverings may not significantly deter child and adolescent socialization, as previously questioned (42). Nevertheless, teachers noted a need to continually monitor students about public health protocols, especially students in younger grades. Research is limited on adherence to mask-wearing and physical distancing among younger children due to their developmental stage (2). The World Health Organization suggests that children aged five and under should have an adult present to assist and supervise the safe and appropriate use of masks (43). Teachers returning to the classroom may need additional support and resources for age-appropriate methods to ensure that students are able to follow health and safety protocols during school reopening.

Modifying current teaching styles to accommodate public health protocols was another consideration in the present study. Notably, many teachers spoke about avoiding key teaching activities, such as group work, to ensure physical distancing. Research suggests that the absence of collaborative work in the classroom may impact students’ learning, engagement and academic outcomes. For example, students may feel increased loneliness and less motivation to learn if all schoolwork is independent (44, 45). Furthermore, some teachers reported that mask-wearing and physical distancing interfered with their ability to communicate and connect with students effectively. This finding of impacted communication is consistent with research reporting that face masks can muffle speech and obscure facial features and emotions (46, 47). Thus, innovative teaching strategies to increase classroom engagement and communication will be imperative to support achievement goals during school reopening, especially for teachers instructing students with greater communication needs (47, 48).

Our findings of competing priorities align with current research that identified themes of uncertainty, worry and impacted professional identity among teachers who transitioned to online teaching at the beginning of the pandemic lockdown (14). Indeed, teaching within a rapidly changing environment with additional responsibilities, fewer resources and greater expectations can affect both personal and professional identity (49), with implications on job satisfaction, burnout, attrition and mental health (50). Across Canada, surveys of teachers and school leaders revealed that online, in-person condensed and hybrid models of teaching and learning were not sustainable for educators (51-53).

The hybrid model, where students attended both in-person school and online remote school were particularly problematic, as teachers felt they were teaching a double curriculum (24). High levels of teacher stress has been shown to be detrimental to classroom environments and students' mental health and wellbeing (54). In the present study, teachers strived to balance core teaching values (55) with public health protocols, suggesting that teachers may be required to play dual roles when they return to school. Public health agencies and school boards should engage teachers in ongoing school operation discussions, with explicit guidelines about teachers' roles and responsibilities during reopening, as well as the provision of human and technical supports (56).

Limitations

This study's cross-sectional design represented a snapshot of participants' experiences, and the convenience sampling permitted selection bias and limited generalizability of findings to all teachers in Ontario. Furthermore, data collection relied on teacher reports on their and their students' adherence to public health protocols during the simulation, which could be biased. Findings from the larger "Back to School COVID-19 Simulation Study" will have observational data on teacher and student mask-wearing, physical distancing and hand hygiene behaviours. We also acknowledge the limitations of the simulation-based design of the study that may have impacted participant behaviours and experiences. All participants received a COVID-19 test prior to participation and were excluded if they tested positive. It is possible that participants were less concerned about contracting COVID-19 and this could have impacted their adherence with public health protocols. Lastly, each simulation classroom involved a maximum of 15 English-only students and desks were spaced two meters apart. Therefore, our study design may not reflect the reality of Ontario's school reopening as larger class sizes may challenge the ability to physical distance, and students with diverse needs may require additional supports. Further longitudinal research is needed to investigate the long-term impacts of public health protocols on in-person school for teachers and teaching. Exploring teachers' experiences instructing in French, English-learner students, or those with special education needs is also warranted.

Conclusion

As schools transition from online to in-person instruction, teachers will be required to play dual roles in education and public health. Our findings identified navigating public health protocols, adapting teaching strategies and managing

competing priorities as key areas of concern for teachers. Teachers also reported that mask-wearing and physical distancing impacted their teaching, communication and connection with students. Public health agencies and school boards are encouraged to meaningfully engage teachers in ongoing conversations regarding in-person school planning and operations. Evidence-based interventions that emphasize real-world effectiveness and relevance, including inquiry-based stress reduction (57) and increased teaching development programs (58), are recommended to support teachers returning to school during the COVID-19 pandemic.

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Conflicts of Interest

The authors have no financial relationships to disclose.

References

- Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. *The Lancet Child & Adolescent Health*. 2020;4:397-404.
- Science MB, Sean A. COVID-19: Guidance for school reopening updated. Hospital for Sick Children. 2020 [cited 2020 Dec 1]. Available from: <https://www.sickkids.ca/siteassets/news/news-archive/2020/covid19-recommendations-for-school-reopening-sickkids.pdf>
- Children's Mental Health Ontario. Return to school during COVID-19: Considerations for Ontario's child and youth community mental health service providers. 2020 [cited 2021 Sept 13]. Available from: <https://cmho.org/wp-content/uploads/Return-to-school-during-COVID19-Evidence-summary-for-community-service-providers.pdf>
- Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. *The Lancet*. 2020;395(10227):912-20.
- Poletti M. Hey teachers! Do not leave them kids alone! Envisioning schools during and after the coronavirus (COVID-19) pandemic. *Trends Neurosci Educ*. 2020;20:100140.
- Vaillancourt T, McDougall P, Comeau J. COVID-19 school closures and social isolation in children and youth: Prioritizing relationships in education. *FACETS*. 2021;6:1795-1813.
- Okruzsek Ł, Aniszewska-Stańczuk A, Piejka A, Wiśniewska M, Żurek K. Safe but lonely? Loneliness, anxiety, and depression symptoms and COVID-19. *Front Psychol*. 2020;11:3222.
- Cost KT, Crosbie J, Anagnostou E, Birken CS, Charach A, Monga S, et al. Mostly worse, occasionally better: Impact of COVID-19 pandemic on the mental health of Canadian children and adolescents. *Eur Child Adolesc Psychiatry*. 2021:1-14.
- Magson NR, Freeman JY, Rapee RM, Richardson CE, Oar EL, Fardouly J. Risk and protective factors for prospective changes in adolescent mental health during the COVID-19 pandemic. *Journal of Youth and Adolescence*. 2021;50(1):44-57.
- Newkirk V. The kids aren't all right. *The Atlantic*. 2020 [cited 2021 Sept 13]. Available from: <https://www.theatlantic.com/health/archive/2020/03/what-coronavirus-will-do-kids/608608/>
- Aperribai L, Cortabarria L, Aguirre T, Verche E, Borges A. Teacher's physical activity and mental health during lockdown due to the COVID-2019 pandemic. *Front Psychol*. 2020;11:577886.
- Gudmundsdottir GB, Hathaway DM. "We always make it work": Teachers' agency in the time of crisis. *JTATE*. 2020;28(2):239-50.
- Kim LE, Dundas S, Asbury K. 'I think it's been difficult for the ones that haven't got as many resources in their homes': Teacher concerns about the impact of COVID-19 on pupil learning and wellbeing. *Teachers and Teaching*. 2021:1-16.
- Kim LE, Asbury K. 'Like a rug had been pulled from under you': The impact of COVID-19 on teachers in England during the first six weeks of the UK lockdown. *Br J Educ Psychol*. 2020;90(4):1062-83.
- Sokal L, Trudel LE, Babb J. Canadian teachers' attitudes toward change, efficacy, and burnout during the COVID-19 pandemic. *IJEDRO*. 2020;1:100016.
- Harding S, Morris R, Gunnell D, Ford T, Hollingworth W, Tilling K, et al. Is teachers' mental health and wellbeing associated with students' mental health and wellbeing? *J Affect Disord*. 2019;242:180-7.
- Carey K. The real value of teachers: Using new information about teacher effectiveness to close the achievement gap. *Thinking K-16*. 2004;8(1):3-42.
- Hattie J. *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*: Routledge; 2008.
- Morse SL. Need a plan to reopen schools? Ask the teachers. Canadian Teachers' Federation. 2020 [cited 2021 Sept 13]. Available from: <https://www.ctf-fce.ca/need-a-plan-to-reopen-schools-ask-the-teachers/>
- Government of Ontario. News release: Ontario releases plan for safe reopening of schools in September [press release]. 2020 [cited 2020 Dec 18]. Available from: <https://news.ontario.ca/en/release/57838/ontario-releases-plan-for-safe-reopening-of-schools-in-september>
- Government of Canada. COVID-19 guidance for schools Kindergarten to Grade 12. 2020 [cited 2020 Dec 18]. Available from: <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/guidance-schools-childcare-programs.html>
- Ewing J. The ridiculousness of learning loss. *Forbes*. 2020 [cited 2021 Sept 13]. Available from: <https://www.forbes.com/sites/johnewing/2021/12/28/the-ridiculousness-of-learning-loss/?sh=4674d4e27c32>
- von Stackelberg M. Majority of Manitoba teachers want mandatory COVID-19 vaccines for staff, questionnaire says. *CBC News*. 2021 [cited 2021 Sept 13]. Available from: <https://www.cbc.ca/news/canada/manitoba/schooling-under-stress-manitoba-teachers-1.6031947>
- Canadian Teachers' Federation. Canadian teachers responding to coronavirus (COVID-19): Pandemic research study. 2020 [cited 2021 Sept 13]. Available from: <https://vox.ctf-fce.ca/wp-content/uploads/2020/07/National-Summary-Report-OVERVIEW-Pandemic-Research-Study-Jul-22.pdf>
- Wong J. How parts of Canada are going about vaccinating teachers against COVID-19. *CBC News*. 2021 [cited 2021 Sept 13]. Available from: <https://www.cbc.ca/news/health/covid-edu-immunization-approaches-1.5971988>.
- Creswell JW, Poth CN. *Qualitative inquiry and research design: Choosing among five approaches*: Sage Publications; 2016.
- Reiners GM. Understanding the differences between Husserl's (descriptive) and Heidegger's (interpretive) phenomenological research. *J Nurs Care*. 2012;1(5):1-3.
- Krueger RA. *Focus groups: A practical guide for applied research*: Sage Publications; 2014.
- Kitzinger J. Qualitative research: Introducing focus groups. *BMJ*. 1995;311(7000):299-302.
- Sanders C. Application of Colaizzi's method: Interpretation of an auditable decision trail by a novice researcher. *Contemp Nurse*. 2003;14(3):292-302.
- Kohl E, McCutcheon P. Kitchen table reflexivity: negotiating positionality through everyday talk. *Gen Place Cult*. 2015;22(6):747-63.
- Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol*. 2006;3(2):77-101.
- Braun V, Clarke V. To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qual Res Sport Exerc Health*. 2021;13(2):201-16.

34. Guest G, Namey E, McKenna K. How many focus groups are enough? Building an evidence base for nonprobability sample sizes. *Field Methods*. 2017;29(1):3-22.
35. Englander M. The interview: Data collection in descriptive phenomenological human scientific research. *J Phenomenol Psychol*. 2012;43:13-35.
36. Baxter J, Eyles J. Evaluating qualitative research in social geography: Establishing 'rigour' in interview analysis. *Trans Inst Br Geogr*. 1997;22(4):505-25.
37. Richards L. *Using NVivo in qualitative research*: Sage Publications; 1999.
38. Ontario's school reopening plans met with mixed reactions [Video]. *City News*. 2020 [cited 2020 Dec 18]. Available from: <https://toronto.citynews.ca/video/2020/06/19/ontarios-school-reopening-plans-met-with-mixed-reactions/>
39. Zuber MC. Coronavirus: Face masks for teachers may impact child's ability to learn, experts warn. *Global News: The Canadian Press*. 2020 [cited 2021 Feb 8]. Available from: <https://globalnews.ca/news/7271348/coronavirus-teacher-face-mask-impact-childs-learning/>
40. Neustaeter B. How wearing a mask at school can impact a child's development. *CTV News* 2020 [cited 2020 Dec 18]. Available from: <https://www.ctvnews.ca/health/coronavirus/how-wearing-a-mask-at-school-can-impact-a-child-s-development-1.5105832>
41. Government of Canada. Coronavirus disease (COVID-19): Measures to reduce COVID-19 in your community. 2020 [cited 2020 Dec 18]. Available from: <https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks/measures-reduce-community.html>
42. Spitzer M. Masked education? The benefits and burdens of wearing face masks in schools during the current Corona pandemic. *Trends Neurosci Educ*. 2020;20:100138.
43. World Health Organization. Coronavirus disease (COVID-19): Children and masks. 2020 [cited 2021 Sept 13]. Available from: <https://www.who.int/news-room/q-a-detail/q-a-children-and-masks-related-to-covid-19>
44. Bonell C, Melendez-Torres GJ, Viner RM, Rogers MB, Whitworth M, Rutter H, et al. An evidence-based theory of change for reducing SARS-CoV-2 transmission in reopened schools. *Health Place*. 2020;64:102398.
45. Lavy S, Naama-Ghanayim E. Why care about caring? Linking teachers' caring and sense of meaning at work with students' self-esteem, well-being, and school engagement. *Teaching and Teacher Education*. 2020;91.
46. Marler H, Ditton A. "I'm smiling back at you": Exploring the impact of mask wearing on communication in healthcare. *Int J Lang Commun Disord*. 2020.
47. Greenberg HLJ. COVID-19: How educators can build interactions while balancing precautions. *The Hanen Centre*. 2020 [cited 2020 Dec 18]. Available from: <http://www.hanen.org/Helpful-Info/Articles/COVID-19-Balance-Precautions-Build-Interactions.aspx>
48. Wolfe J, Smith J, Neumann S, Miller S, Schafer EC, Birath AL, et al. Optimizing communication in schools and other settings during COVID-19. *The Hearing Journal*. 2020;73(9):40-2.
49. Nguyen TD, Pham LD, Crouch M, Springer MG. The correlates of teacher turnover: An updated and expanded Meta-analysis of the literature. *Educ Res Rev*. 2020;31.
50. Stein-Zamir C, Abramson N, Shoob H, Libal E, Bitan M, Cardash T, et al. A large COVID-19 outbreak in a high school 10 days after schools' reopening, Israel, May 2020. *Euro Surveill*. 2020;25(29).
51. Kraft MA, Simon NS, Lyon MA. Sustaining a sense of success: The importance of teacher working conditions during the COVID-19 pandemic. *EdWorkingPaper*; 2020.
52. McMillan E. "The challenge was real" for Nova Scotia teachers in a pandemic school year: *CBC News*; 2021 [cited 2021 Sept 13]. Available from: <https://www.cbc.ca/news/canada/nova-scotia/teachers-questionnaire-covid-classroom-1.6026529>
53. Wong J. With summer vacation looming, educators worry about lasting fallout of pandemic schooling. *CBC News*; 2021 [cited 2021 Sept 13]. Available from: <https://www.cbc.ca/news/canada/teacher-questionnaire-pandemic-year-end-1.6025149>
54. Gray C, Wilcox G, Nordstokke D. Teacher mental health, school climate, inclusive education and student learning: A review. *Canadian Psychology/Psychologie canadienne*. 2017;58(3):203-10.
55. Abós Á, Sevil-Serrano J, Kim LE, Klassen RM, García-González L. How should stressors be examined in teachers? Answering questions about dimensionality, generalizability and predictive effects using the multicontext stressors scale. *Int J Environ Res Public Health*. 2019;16(18):3388.
56. Harris A, Jones M. COVID 19 – school leadership in disruptive times. *Sch Leadersh Manag*. 2020;40(4):243-7.
57. Zadok-Gurman T, Jakobovich R, Dvash E, Zafrani K, Rolnik B, Ganz AB, et al. Effect of inquiry-based stress reduction (IBSR) intervention on well-being, resilience and burnout of teachers during the COVID-19 pandemic. *Int J Environ Res Public Health*. 2021;18(7):3689.
58. Pozo-Rico T, Gilar-Corbí R, Izquierdo A, Castejón J-L. Teacher training can make a difference: Tools to overcome the impact of COVID-19 on Primary schools. An experimental study. *Int J Environ Res Public Health*. 2020;17(22):8633.