Cross-National Variation in School Reopening Measures During the COVID-19 Pandemic

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To contain the initial spread of the SARS-CoV2 virus and the COVID-19 disease, many countries opted to close schools. However, the importance of schooling to mitigate inequalities motivated many economies to reopen schools after having formulated various COVID-19 mitigation and containment strategies. Using an exploratory sequential mixed method design, we explore the measures undertaken by countries when reopening schools and how these measures varied cross-nationally. We find that countries formulated a wide number (total: 242) and range of school reopening measures to mitigate the spread of the virus in the early months of the COVID-19 pandemic. From a policy diffusion theoretical perspective, findings from our statistical analyses suggest that cross-national diversity in policies is related to both internal and external country factors such as peer emulation mechanisms, income, and past pandemic experiences. We urge international agencies for more explicit guidelines for effective school reopening measures.

Keywords: *COVID-19, school reopenings, policy diffusion, cross-national*

AMOUNTING to nearly 13 million confirmed cases and 600,000 attributable deaths globally by mid-July, 2020,[1] the COVID-19 pandemic has affected significant aspects of human activity around the world including the education of K–12 children. In response, many countries formulated mitigation measures outside the scope of health care settings known as non-pharmaceutical interventions (NPIs). NPIs have been efforts to contain the virus and lower transmission rates in communities before effective vaccines could be developed (Chu et al., 2020). Although scholars and policy makers have debated the ethics and efficacy of school closures (Esposito & Principi, 2020; Silverman et al., 2020), as of April 2020, a majority of countries (more than 190) had mandated nation- or region-wide school closures as part of their NPIs, meaning that an estimated 90% of students across the globe (almost 1.6 billion) had their education greatly disrupted and/or were out of school (Donohue & Miller, 2020; Giannini et al., 2020). These school closures occurred rapidly around the world in a matter of days or weeks despite variance in country characteristics, such as income level, and rates of infection (Nazif-Munoz et al., 2020).

If education policymakers had any hope of reopening schools in the midst of the pandemic, they needed to develop COVID-19 mitigation and containment strategies in school settings at an unprecedented level. Decision makers faced limited resources, experience, and evidence as much was unknown at the time about COVID-19's spread or infection. Despite this uncertainty, UNESCO declared that countries should reopen as promptly as possible or at least establish plans for future reopenings given that prolonged closures of school systems are known to exacerbate inequities (Giannini et al., 2020). With the negative consequences of school closures, such as economic and workforce implications, student learning loss, and diminished social and emotional development (Christakis, 2020; Kuhfeld & Tarasawa, 2020; Sheikh et al., 2020), countries around the world gradually reopened schools after initial closures. Beyond these pressures to minimize the negative consequences of school closures, many countries argued that it was safe to reopen schools with precautionary measures once the virus' reproduction rate (R_0) fell below a certain threshold and in consideration of the evidence at the time that children were less likely to endure its

most severe symptoms and complications (CDC COVID-19 Response Team, 2020; Lu et al., 2020; Zimmermann & Curtis, 2020) and might also be less likely to contract and potentially spread COVID-19 (Davies et al., 2020; B. Lee & Raszka, 2020; National Academies of Sciences, Engineering, and Medicine, 2020).[2] Overall, school reopenings occurred at a much slower rate than their closures, but by the time data for this study were collected (July 2020), more than 50 countries had partially or completely reopened schools, employing a variety of "policy measures and practices" in response to the ongoing pandemic (Chavatzia & Watanabe, 2020, p. 14).

In an attempt to support policy makers' ongoing school reopening decisions, scholars began documenting various country's school reopening strategies (e.g., Chavatzia & Watanabe, 2020; Guthrie et al., 2020; Melnick & Darling-Hammond, 2020). None, however, did so in a comprehensive manner or analyzed them to explain cross-national variation. In this study, we used an exploratory sequential mixed method design to understand and explain the measures proposed by countries when they decided to reopen schools in the second quarter of 2020. In the qualitative phase of our study, we utilized document analysis (Bowen, 2009) to explore school reopening measures in 49 countries (listed in online Supplemental Appendix A) in order to better understand which policy measures and practices (hereafter referred to as measures) were formulated during the early months of the COVID-19 pandemic. Building on these findings, we designed the quantitative phase of our study. Using the policy diffusion theory of emulation due to both geographic and political proximity (Shipan & Volden, 2012) as well as complexity theory (Angeli & Montefusco, 2020; Morel & Ramanujam, 1999), we explain cross-national variation in the types of proposed measures across several world regions (East Asia and Pacific, Central Asia and Europe, Latin America and the Caribbean, North America, and Sub-Saharan Africa; The World Bank, 2021). After detailing the relevant literature, data and methodology, and findings for the qualitative and quantitative portions of our study, we discuss the significance of our findings and implications for ongoing education policy responses to this and future pandemics.

Considerations Taken Into Account for School Reopenings

When policymakers were designing plans for this initial phase of school reopenings, much was unclear as to how to safely return students to schools. Previous pandemics (SARS [severe acute respiratory syndrome] outbreaks in 2003, H1N1 in 2009, and MERS [Middle East respiratory syndrome] in 2012) provided some models of mitigation responses in educational settings, although none had occurred at the global scale, speed, and intensity of the COVID-19 pandemic. During the SARS outbreak, researchers understood the importance of schools having "good public health measures to prevent infection" and proposed a variety of school-based measures, including effective ventilation, hygienic classroom and bathroom spaces, and the regular cleaning of surfaces (A. Lee et al., 2003, p. 945). Although school-based disease control strategies were not systematically documented for SARS, some countries' responses during this period stood out and have been similarly utilized against the spread of COVID-19, for example, the use of rigorous temperature monitoring in Singapore (Chng et al., 2004; Tan, 2006). However, recognizing that communities that experienced SARS might now reformulate these learned mitigation strategies for COVID-19, Wilder-Smith et al. (2020) warned that taking similar precautions as during SARS may prove inadequate in the contemporary pandemic given the "differences in the virus characteristics" including the "infectious period, transmissibility, clinical severity, and extent of community spread" (p. e102).

Scholars, practitioners, and epidemiologists have urged for COVID-19 school reopening plans to be established using evidence-based approaches specific to this disease (see, e.g., Lordan et al., 2020). Yet as of July 2020 much remained unknown regarding the details of its transmission and viral infection as well as the efficacy of potential interventions and policies at the school and classroom levels. In response, the National Academies of Sciences, Engineering, and Medicine (2020) proposed a framework with five categories of mitigation ("control") strategies for addressing COVID-19 in the field of education policy. Of the categories —elimination, substitution, engineering, administrative, and personal protective equipment (PPE) —the latter three are those most relevant for conceptualizing the range of school reopening measures. In this framework, engineering refers to steps taken to eliminate the virus before an individual comes into contact with it; administrative strategies are changes in the way people work; and PPE are masks and face shields for individual use.

What is still unclear, however, is the extent to which this framework mapped onto the considerations of education policy makers in the development of early school reopening policies. Our study presents a first step in answering this question. In particular, we anticipated that education systems were likely to formulate measures across these three levels simultaneously, complicating this framework in practice. For example, the utilization of "bundled interventions," which include elements of both PPE and social distancing, often span two or three of the categories presented in this framework depending on the particular method used to ensure distancing between individuals (Chu et al., 2020, p. 1979). In short, we suspected that significant variances between countries were present in early school reopening decisions. This led to our first research question:

Research Question 1: What school-level measures did countries formulate when reopening schools after COVID-19 related school closures?

Qualitative Data and Method

In the first stage of our study, we conducted qualitative "document analysis" to systematically review and evaluate policy documents by combining elements of traditional "content" and "thematic analyses" (Bowen, 2009, p. 32). This particular method offered the best fit in addressing our research question precisely because, as utilized in the public health policy field, it allows for the analysis of "specific types of policy as they [. . .] differ across geographies" (Dalglish et al., 2020, p. 1425).

To begin the data collection, we looked at countries with documented school closures due to COVID-19 that also reopened or released reopening plans by July 2020. To determine which countries met this initial criterion, we cross-referenced two databases from UNESCO (2020) and the Center for Global Development (2020), frequently checking for updated information on a country-by-country basis over a multiweek-long period. We chose to only include countries in which schools had formally closed to ensure that they had been significantly affected by the COVID-19 pandemic.[3] In the end, we determined that 49 countries fit our selection criteria.

Sources Describing School Reopening Policies

We searched for documents in countries where information was publicly available regarding school measures taken to enable the safe reopening of schools. We focused on documents and excerpts that contained country-specific details of policies or practices rather than general context-free recommendations about what policies "should" or "should not" be (e.g., broad Centers for Disease Control and Prevention or the World Health Organization recommendations). Given the benefits of reviewing across a mix of document types, we consulted a variety in our collection process, including official documents (policies or policy directives as well as government statements and declarations), documents from media and communications (newspaper, magazine articles, and webpages), and grey literature (white papers and institutional reports/evaluations). Ultimately, we sorted our collected documents into three categories: primary documents, research reports, and popular media sources (see online Supplemental Appendix B for a detailed description of the search process by category). We selected these document types because they allowed us to analyze policy content cross-nationally as opposed to understanding the policy making process (Dalglish et al., 2020).

Our collection of data from these three categories of sources resulted in a total of 105 documents for analysis.[4] Due to both the variation in types of documents collected as well as the range in publicly available information, the number of documents for each country and the instances of specific countries mentioned in the documents varied greatly (see online Supplemental Appendix C for the document list for each country by document type and online Supplemental Appendix D for the number of documents for each country by document type). For example, 11 countries were only mentioned in a single document, whereas Denmark and China were included in 27 and 32 documents, respectively.

To analyze the formulated policies using document analysis procedures, we followed the steps outlined by Bowen (2009, p. 32). First, we drew on content analysis techniques by skimming a subset of the documents and through this "superficial examination" developed an overview of the data as well as an identification of relevant text. Then, on a first pass, we carefully read each document and throughout this "thorough examination" we coded every instance of a unique measure. Our fine-grained analyses resulted in 242 codes, each indicating a distinct school or classroom redesign measure, such as whether masks were required in the school building and for whom, or whether student temperature screenings occurred on arrival.[5] As we iteratively began the interpretation process, we moved to thematic analysis procedures in order to search for patterns and themes across the data (Fereday & Muir-Cochrane, 2006). Here, during a second pass in which we carefully reread the documents, we utilized "constant comparison to delineate patterns and thematic emphases" among the individual measures observed (Altheide et al., 2008, p. 130). This resulted in nine overarching themes (described below). These themes were decided on collaboratively after a meeting in which each coauthor independently presented an organization of the 242 codes into categories.

Qualitative Findings

In Table 1 we provide the 242 distinct measures, categorized across nine themes, for all the school reopening measures found in the 49 countries. Five themes, which we labeled "Basic Measures," included the majority of the measures, making up 86% of observations (207 out of 242). Importantly, we observed that many countries formulated measures from a combination of those included in the Basic Measures themes: At least one measure from all five themes was found in 19 countries, and 22 countries utilized measures from at least one measure from four of the five themes. A second set of themes we labeled "Extended Measures" were less prominent in the collected documents, making up only 14% of the total observations (33 out of 242).

Basic Measures

All 49 countries reported a single measure or more in at least one of the following five Basic Measures. Each

TABLE 1
School Reopening Measures in 49 Countries

1. *Physical distancing/minimizing contact*: Changes to the routines/structures (within the school day) to minimize contact that do not alter the school calendar (86 measures documented in 43 countries)

Adult distancing	No contact greeting
Assigned bathrooms	No contact physical education
Assigned entrance points	No family entry
Assigned seats	No group assignments
Broadcast assemblies	No shared computers
Broadcast class	No shared food
Bubble approach	No shared supplies
Cafeteria closed	No singing
Canceling large gatherings (assemblies)	No staff gathering
Closed libraries	No utensils
Conducting lessons outdoors	One student per desk
Confirmed case: class suspended 14 days	Outdoor space divided
Designated routes to class/pick-up and drop-off areas	Outdoor space usage/play time staggered
Desks in rows	Physical distancing (cafeteria)
Discouraged cafeteria usage	Physical distancing (classroom)
Doors removed	Physical distancing hats
Eat at desks in classroom	Physical education suspended
Eat in homeroom shifts	Prepackaged food
Eat in silence	Private transportation encouraged
Eat lunch in hallway	Reduction in class size/ max class size
Eat snacks in assembly hall	Removal of board games
Electives teachers in homeroom classes	Restricted water fountain use
Encouraged use of outdoor space	School buses with one student per row
Extracurricular activities cancelled/modified	School buses with seats further apart
Family/visitor entry minimized	Single file lines
General physical distancing	Social distancing
Group desks broken up	Spaces well ventilated
Gyms used as classrooms	Split class
Handshakes discouraged	Sports competitions cancelled
Increased supervision	Sports suspended
Individual play	Stable desk clusters
Indoor sports canceled	Stable homeroom
Libraries used as classrooms	Staff meetings online
Limit shared materials/clean between use	Staggered arrival/dismissal
Limited students in restrooms	Staggering breaks
Limited to small groups	Students divided into groups
Lunch staggered	Students use personal equipment
Markings on ground	Teachers move between homerooms
Markings on table	Teachers remind about physical distancing
Maximizing entirety of school day	TVs replace whiteboards
Multiple entrances	Utilization of entire school space
Must stay in classroom between classes	Windows, doors, and air vents left open
No ball sports	
No contact allowed	

2. *Hygiene and cleaning*: Additional steps to keep spaces and people clean or contaminant-free (41 measures documented in 43 countries)

Cafeteria hygiene requirements	Handwashing before and after meals
Clean desks between classes	Hygiene practices
Clean thermometer after each use	Lidded garbage bins
Cleaning fact sheet	Playground equipment cleaned after each use
Cleaning frequency increased	Provision of water, sanitation, and hygiene ("WASH") supplies
Cleaning of surfaces	Respiratory etiquette

TABLE 1 (CONTINUED)

2. *Hygiene and cleaning*: Additional steps to keep spaces and people clean or contaminant-free (41 measures documented in 43 countries)

Cleaning school buses	Sanitary facilities
Clothes sprayed with disinfectant	School cleaned and disinfected
Confirmed case: deep cleaning	Sneeze/cough into elbow
Disinfect cafeteria	Sterilized eating utensils
Disinfect classroom	Students disinfect desks
Disinfection kit provided	Students disinfect sports equipment
Disinfection point	Students help clean
Frequent common area cleaning	Tablets/computers wiped after use
Frequent handwashing	Teachers monitor handwashing
Fumigation of classrooms before reopening	Toilets/sinks cleaned regularly
Garbage bins taken out daily	Wash hands on entry
Government provided cleaner	Weekly building deep clean
Hand sanitizer	Wipe door knobs/desks
Handwash after using toilet	
Handwash before dismissal	
Handwash before library use	

3. *Health screening*: Symptom checks, diagnostic testing, and structured follow-up procedures (37 measures documented in 31 countries)

Body temperature monitoring screen	Quarantine areas
Cafeteria staff health check	Quarantine if traveled
Contact tracing	Random rapid testing
Daily screening	Return to school after symptom-free 1 day
Fill out home questionnaire	Sent home if symptomatic or contact with infection
Follow up with absent students	Signed parent health form
Government provided thermometers	Staff temperature check
Health risk survey (app)	Student COVID-19 diagnostic testing
If contact with infected: do not attend school	Student COVID-19 diagnostic testing (student administered)
If contact with infected: quarantine 14 days	Student temperature checks
If negative: no mask	Student temperature checks (parent reported)
If negative: wear green sticker	Students take own temperature
If positive: home for 2 weeks	Symptoms check on arrival
If symptoms: hospital evaluation	Teacher COVID-19 diagnostic testing
If symptoms: sent home for 48 hours	Teacher risk assessment
If symptoms: stay home	Temperature checks ($2 \times$ daily)
If symptoms: wait in designated room for pick up	Temperature checks on arrival
Parents report travel	Thermal scanners
QR code sign-in	

4. *School schedule/operations*: Changes to the whole-school schedule operations with the goal of minimizing exposure (25 measures documented in 40 countries)

Alternative academic calendar	Online school
Cancelled exams	Optional onsite school attendance
Conditional opening	Phased reopening
Confirmed 2+ cases: school suspended 14 days	Possible school reclosure
Confirmed case: school close	Progressive reopening (learning priority)
Contingency plan	Progressive reopening (low-risk areas)
Early dismissal/shortened school day	Progressive reopening (older first)
Half-day classes	Progressive reopening (younger first)
Home-based learning	Remote/blended teaching
In-person instruction only 1 day a week	Staggered attendance
In-person instruction only 3 days a week	Staggered attendance exception for essential workers' children
No crossing district boundaries	Staggered teacher return
Off-peak school hours	

(continued)

TABLE 1 (CONTINUED)

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5. *Personal protective equipment (PPE)/Physical barriers*: Protective barriers between people (18 measures documented in 23 countries)

Dividers	Protective visors/face shields
Eat with dividers	Recess with masks
Gloves required	Staff wear PPE when taking students temperatures
Government provided masks	Teacher desk shielded
Mask required if symptomatic	Teacher wears gloves
Masks	Teacher wears mask
Masks optional	Teachers decide if students wear masks in class
Masks required	
Masks required in school common areas	
PPE	
PPE provided to staff if school member symptomatic	

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6. *Dissemination of information*: Raising awareness about COVID-19 precautionary measures (10 measures documented in 17 countries)

Cleaning guidance disseminated	Share COVID-19 information
Hygiene posters and videos	Specific guidelines
Parents inform children about precautionary measures	Student hygiene online classes
Physical distancing posters	Teacher provision of daily COVID-19 message
Posters about COVID-19	
Principals/administrators give health and safety briefings	

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7. *Student social and emotional health*: Steps taken to address student social, emotional, and psychological well-being (9 measures documented in 12 countries)

Health and social service provision	Psychosocial support
Liaising with school counselors	Social-emotional specialists
Mental health	Trauma-informed practice
Positive messages	Well-being resources
Promote self-care strategies	

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8. *Teacher support/training*: COVID-19 related training and support provided to teachers (8 measures documented in 11 countries)

Additional staff	Staff mental health training
Nonteaching staff provide support	Staff orientation/training
Staff drills	Strengthening of teaching aides
Staff hygiene training	Teacher support/online training

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9. *Student general health*: Additional measures to promote overall student health (6 measures documented in 4 countries)

Availability of clean drinking water	Promote physical exercise
Herbal extract	School health protocols
Promote balanced nutrition	Temporary hiring of school nurses

Note. Number of total measures = 242. Two measures, collaboration with local authorities and monitoring mechanisms, did not fit under any of the nine themes.

theme is described below in order of their observation frequencies.

Physical Distancing/Minimizing Contact. The most commonly observed measure type described changes to the routines or structures within the school day to "prevent onward person-to-person virus transmission by minimizing contact" between individuals (Milne & Xie, 2020, p. 2). These measures, unlike those categorized as "School Schedule/Operations" did not alter the broader school schedule or days/hours of operation for any/all student(s). These 86 measures were documented in 43 out of the 49 countries across several world regions. Among these countries, Denmark had the highest number of total observed measures in this theme, with documents revealing the country's formulation of 26 distinct actions intended to minimize contact between individuals while on school property. Denmark was also one of eight countries (all located in North America and Europe) in which documents referred to its utilization of a "bubble approach" where, in an effort to limit and control contact interactions, students and teachers were placed together in small, consistent groupings for all school activities.

Hygiene/Cleaning. We found that 43 countries formulated policies requiring schools to take additional steps to keep spaces and people clean or contaminant-free. In this theme, 41 distinct measures were observed across documents including daily actions such as increasing student hand washing procedures, more frequent utilization of hand sanitizer, and the cleaning of surfaces, to more intensive strategies such as fumigation of school spaces before reopening (in Ghana and Gambia) and deep cleaning of classrooms when a case of the virus was confirmed (e.g., in Australia and New Zealand).

Health Screening. We found 37 measures across documents from 31 countries related to screening students and teachers through symptom checks, diagnostics testing, and structured follow-up procedures including contact tracing. Across various countries, symptom checking included both self- and parent-reported questionnaires (China and South Korea, e.g., used a digital app to collect these) and routine temperature readings on arrival at school through individual thermometers or broad thermal scanners (such as in Hong Kong and South Korea). Less frequently, students or teachers were required to undergo COVID-19 diagnostic testing to determine whether or not they had contracted the virus. In particular, Benin stood out as the only country for which documents mentioned only teacher diagnostic testing and no testing of students. Additionally, Germany was the only country in which we observed students self-administering the test. With respect to contact tracing, New Zealand utilized an innovative QR code sign-in for students so that emergent cases could be traced quickly and appropriate quarantine procedures employed.

School Schedule/Operations. Twenty-five of the observed measures related to changes to the whole-school's schedule or operations with the goal of minimizing exposure. These measures were documented in 40 countries. In simple terms, these measures described which students could attend reopened schools and when they could do so. When reopening, many countries elected not to fully reopen all their schools simultaneously but instead did so partially and over time by opening schools based on student characteristics (observed in 24 countries) and/or in phases when certain conditions (such as low rates of viral community spread) were met (observed in 13 countries). With respect to progressive reopening, three different reopening strategies based on student characteristics were emergent in the documents: nine countries opened schools based on student age/grade level with younger students first such as in Norway and Denmark, while four countries also considered these same characteristics but instead first opened the schools of older students such as in Australia and Greece, and 10 countries opened schools for students with a learning priority including those students sitting examinations, those with

special needs, and/or those of essential workers. Beyond this, countries employed a variety of measures to limit the total number of students at school at a time including using a combination of in-person and blended learning and numerous staggered attendance methods.

PPE/Physical Barriers. We noted a total of 18 measures concerning protective barriers between people in the school setting in 23 countries. These included instances of the requiring of or encouraging individuals to wear masks as well as the placement of stationary dividers in classrooms or cafeterias. With respect to masks, measures varied by the participating individual for mask-wearing (student or teacher), by the responsible stakeholder for mask provision (parent or government), as well as by the setting in which mask-wearing compliance was required (entire school or common spaces only).

Extended Measures

Dissemination of Information. Across 17 countries, a total of 10 school or government actions were explicitly mentioned that related to raising awareness about COVID-19 precautionary measures. These measures varied by context in terms of both the stakeholder responsible for disseminating COVID-19 information (parent, teacher, principals/administrators, or the government) as well as the mechanism for delivery (oral announcements, posters, videos, or official instructional guidelines). For instance, in Iceland, principals or school administrators were tasked with giving health and safety briefings, while schools in Austria, South Africa, Greenland, and Singapore (just to state a few) put up posters related to COVID-19 precautions and facts.

Student Social and Emotional Health. Nine measures described steps taken to address student social, emotional, and psychological well-being in 12 countries. These steps ranged from the broad use of trauma-informed practices (Canada) to more specifically increased mental health and psychosocial resources in schools (e.g., in Gambia and New Zealand) and the promotion of self-care strategies (South Africa).

Teacher Support/Training. We found that 11 countries formulated measures pertaining to COVID-19-related training and support provided to teachers. Of the eight measures that fell into this theme, five described countries' efforts to provide additional professional development on the subjects of hygiene, online education, new logistical or operational procedures, and mental health. The remaining three measures related to actions taken to increase the size of the responsible teaching staff, such as the strengthening of teaching aides or assistants in England and the Cook Islands, which included supporting staff in these positions to take on a greater set of responsibilities more similar to that of a lead classroom teacher.

Student General Health. Documents from four countries described six additional measures related to the overall promotion of student health such as the provision of balanced nutrition and recommended exercise in Japan, and access to clean drinking water in Liberia. Additionally, in Madagascar students were given an herbal extract to bolster good health during the pandemic.

Explanations for the Range of Country Responses

These findings revealed a wide number (242) of measures formulated by countries when they decided to reopen schools. The range of measures across the nine themes led us to believe that this was likely the result of a lack of consensus and knowledge about which policies to adopt. In the second quarter of 2020 when schools began to reopen, there was an "absence of a robust evidence base on lockdown exit strategies" such as school and business reopenings (Sheikh et al., 2020, p. 1). Beyond this, accurate understandings of the virus' prevalence were limited. Decision makers need "prevalence estimates based on whatever imperfect evidence exists" in order to make informed choices about health and safety regarding COVID-19 (Fischhoff, 2020, p. 139). In practice, however, policy makers were forced to make decisions without this information, and, consequently, made decisions that were not responsive to the current status of the disease in their respective countries (Mistur et al., 2020). Together, the unfolding scientific understanding of the disease and the evolution of proposed political and social responses presented a context of uncertain and fluid policy (Gao et al., 2020). This led to our second research question:

> **Research Question 2:** What is the relationship among the prevalence of measures and how do these measures compare across countries by various characteristics?

Policy Diffusion in Times of Uncertainty

We first turned to policy diffusion theories to understand the cross-national factors that related to the range of school reopening measures during the early phase of the COVID-19 pandemic. We defined policy diffusion as "one government's policy choices being influenced by the choices of other governments" (Shipan & Volden, 2012, p. 788). From this perspective, policymakers choose to formulate specific policies based on the processes of intergovernmental learning, competition, coercion, or imitation (also referred to as mimicry or emulation).[6] The process of policy diffusion unfolds when decision makers consider both their country-specific needs (internal country characteristics) as well as the policies adopted in other countries (external factors or pressures; Mistur et al., 2020; Sebhatu et al., 2020).

In times of uncertainty, such as the COVID-19 pandemic, however, the diffusion of policies and practices is often driven by social processes such as mimicry or emulation of peers rather than knowledge of their effectiveness or context-specific needs (Shipan & Volden, 2008, 2012; Strang & Meyer, 1993). Due to the urgency of these policy makers' decisions, they are unlikely to select policies based on the process of learning, coercion, or competition. If a policy's efficacy is unknown, its adoption can signal usefulness or virtue and thus drive further adoption by peer countries, regardless of the prevalence level of COVID-19 (Mistur et al., 2020; Sebhatu et al., 2020).

Policies Driven by Peer Emulation

Given the high levels of uncertainty, Mistur et al. (2020) argue that the COVID-19 pandemic offers "a uniquely salient and dynamic context to study diffusion at the international level" (p. 3) and specifically, to isolate the particular mechanisms of peer emulation that fall outside of the diffusion forces of learning, competition, and coercion. The literature supports two driving mechanisms of peer emulation that relate to geographic and political proximity.

Geographic Proximity. In this mechanism, governments emulate the policy choices of their regional neighbors. As policies diffuse, geographic policy clusters develop, creating regions with countries that have formulated similar policies, which can be measured by counting the number of geographically neighboring countries with a shared policy response (Shipan & Volden, 2012). With regard to COVID-19 containment strategies, findings from empirical studies have suggested that policy diffusion occurs when states in the same regions implement similar policies (such as social distancing policies; see Mistur et al., 2020) despite vastly diverse experiences with the pandemic at that time (Lundgren et al., 2020). As such, we predicted the following:

> **Hypothesis 1:** Countries in the same world region formulated measures from the same themes.

Political Proximity. Many scholars have recognized the complex relationship between democracy and diffusion, particularly when political risks are elevated. Although a single study found that democracy level was not associated with speed or decision of COVID-19 school closure (Nazif-Munoz et al., 2020), others have provided strong evidence of the relationship between a country's democratic characteristics and COVID-19 related policy diffusion. For instance, Lundgren et al. (2020) found that national governments characterized as "middle democracies," meaning they were newer or less robust democracies, were more likely to declare States of Emergencies (SOE) than their more established counterparts. Similarly, the most democratic countries

had the slowest adoption of various NPIs and also adopted less stringent amounts and types of NPIs in the early months of the pandemic (Sebhatu et al., 2020). Alternatively, the strongest democracies were also most sensitive to the diffusion of policies from their most proximate peers (Sebhatu et al., 2020). This led to our second hypothesis:

Hypothesis 2: Countries that are more democratic formulated measures from the same themes.

Complexity Theory

Other scholars have posited that rather than their interplay with external factors, countries' internal conditions are important determinants of their policy responses in the contemporary global pandemic context. Drawing on complexity theory (Morel & Ramanujam, 1999), Angeli and Montefusco (2020, p. 2) explained the variation in containment policies observed during the COVID-19 pandemic by focusing on two internal factors influencing a country's implementation of containment policies: the initial state of its social system and the "behavioral rules" or cultural norms ("schemata"), which have been dictated for the members of its society. Initial conditions such as national history, political circumstances, and evolving level of available knowledge, drove policy outcomes.

Income Level. Given the costly nature of many virus mitigation measures and control strategies in school settings (National Academies of Sciences, Engineering, and Medicine, 2020), not all countries that sought to formulate a given measure, whether due to pressures from need or emulation, had the financial means to do so. As a result, decision makers' choices were bound by their country's socioeconomic status. We predicted that higher income countries formulated a greater number of measures or more costly ones.

Hypothesis 3: Countries with higher income levels formulated more measures across more themes.

Cultural Norms in Response to Past Pandemics. As Angeli and Montefusco (2020) argued, policies requiring behavior change are highly moderated by cultural norms. Specifically, mitigation measures such as PPE and screening were more likely to be formulated successfully in countries that already used these mitigation strategies for previous public health crises. Past experiences increased citizen awareness of risks and, additionally, allowed for the modification of existing "behavioral schemata"—an easier process than more comprehensive schematic development. For instance, in addition to temperature monitoring in Singapore, the high levels of mask-wearing in China during the current COVID-19 pandemic has likely been a response to earlier

learnings from SARS in that same context. The implications of this theory have also been borne out empirically. Huang et al. (2020) found that previous pandemic experience (SARS/MERS) was associated with the current performance of a country with respect to COVID-19. Given this, we advanced the following:

Hypothesis 4: Countries that have experienced respiratory virus pandemics formulated measures from the same themes.

Quantitative Data and Method

Data

To explain variation in the formulation of measures stemming from these arguments, we examined differences across the 49 countries across the nine measure themes derived from the qualitative portion of our study. The number of measures observed for each of the nine themes served as our series of nine different dependent variables. We weighted this number by the country's total number of documents given that we observed a smaller number of measures for countries mentioned in fewer documents. The weighted number of policies for each theme are summarized in Table 2 along with descriptive statistics for the variables in our analysis.

World Region. To measure geographic proximity, we started by using the World Bank's (2021) world regions. To address the correlation between income and geographical regions, we aggregated the countries of Central Asia, Europe, and North America into a single region, which was the baseline for these models. The remaining regions were East Asia and Pacific, Latin America and the Caribbean, and Sub-Saharan Africa. Insufficient data were collected for countries in the Middle East and North Africa, and South Asia.

Level of Democracy. For political proximity, we used a democracy index from Coppedge et al. (2020) that assessed the electoral aspect of democracy in each country and the extent to which the ideal of electoral democracy in its fullest sense had been achieved. The index corresponded to an interval scale that ranged from 0 to 1 (fully achieved). Thirty-eight countries had information for this index.

Income Level. Using data from the World Bank (2021), we aggregated countries into high-, middle-, and low-income categories. Based on the large number of high-income countries in our data, we then aggregated countries from low- and middle-income economies into a single category.

Past Pandemic Experience. We constructed an index of experiences with past pandemics, specifically SARS

TABLE 2
Summary Statistics of Reopening Measures and Country Characteristics

Variable	*N*	*M*	*SD*	Minimum	Maximum
Weighted themes of measures for school reopenings					
Hygiene and cleaning	49	1.10	1.36	0	5
Physical distancing	49	1.57	2.28	0	11
Personal protective equipment	49	0.30	0.42	0	2
Screening	49	0.51	0.98	0	6
Dissemination of information	49	0.17	0.40	0	2
Student social and emotional health	49	0.11	0.26	0	1
School schedule and operations	49	0.59	0.96	0	6
General health	49	0.03	0.16	0	1
Teacher support and training	49	0.13	0.35	0	2
Total number of documents per country	49	6.45	7.12	1	32
Country characteristics					
High income level	49	0.61	0.49	0	1
Democracy index	38	0.68	0.24	0.08	0.90
Index of past pandemic experience	49	0.45	0.71	0	2

(2003) and MERS (2012). The index ranged from 0 (*no experience*) to 2 (*experiences with both*). While we originally considered including experience with H1N1, almost every country reported having cases and the variance for this variable was not meaningful. It was therefore not included in the analysis.

Method

We used three statistical techniques to explore the relationship between the formulation of nine school reopening measures and the country-level factors of interest. First, we used matrices of polychoric correlations to assess the relation between one country's measures from a specific theme in relation to any other theme. Second, we used statistical tests of means (*t* tests) to observe the difference between the number of measures in each theme in high-income and low-/middle-income countries. Finally, we used a series of linear regression models to assess the relationship and level of variation explained by world region, democracy, and experiences with past pandemics on school reopening measures. Specifically, we ran two models for each of the nine themes: a saturated model that included all independent variables of interest (geographic region, level of democracy, and experience with past pandemic) and a baseline model including only the past pandemic experience index and world region for all available countries in our data sets.

Quantitative Findings

Prevalence of Measures

As seen in Table 3, we found significant relationships across several measures in the polychoric correlations.

Specifically, we observed that countries that formulated hygiene and cleaning-related measures were also likely to formulate screening and student social and emotional health–related measures ($r = 0.57$, $r = 0.50$, respectively). These countries were also more likely to disseminate information related to raise awareness about the disease and to formulate policies related to teacher support and specific training around the spreading of the disease ($r = 0.58$). A similar relationship was observed for countries that formulated physical distancing measures and screening policies, as well as the dissemination of information around the pandemic ($r = 0.70$). These countries were also likely to invest in social-emotional health and to support their teachers with specific training ($r = 0.58$). At the same time, the formulation of screening policies was strongly correlated to student social and emotional health and the specific training of teachers ($r = 0.73$ and $r = 0.84$, respectively). While these two were also related, the formulation of student social and emotional health policies was likely to be correlated with decreases in the formulation of school schedule/operations modifications throughout the school year ($r = -0.58$).

Country-Level Factors Related to the Formulation of Measures

We present the results from all models for each theme. However, we interpreted findings for the best fitting model for each theme; that is, the model with the highest R^2, indicating the model able to explain most of the variation in the number of measures per theme, as shown in Tables 4 through 12. The R^2 for all models ranged from small to moderate (from .17 for school schedule/operations to .55 for PPE-related measures). The inclusion of

TABLE 3

Polychoric Correlations of Nine Themes of School Reopening Measures

Theme	Hygiene and cleaning	Physical distancing	PPE	Screening	Dissemination of information	Student social and emotional health	School schedule/ operations	General health
Physical distancing	0.58							
Personal protective equipment	0.13	0.35						
Screening	0.57	0.70	0.41					
Dissemination of information	0.66	0.68	0.08	0.48				
Student social and emotional health	0.50	0.55	0.19	0.73	0.53			
School schedule and operations	0.04	−0.13	0.06	−0.04	−0.18	−0.58		
General health	0.17	0.33	0.24	0.43	0.20	0.47	−0.51	
Teacher support and training	0.58	0.58	0.24	0.84	0.34	0.60	−0.16	0.41

Note. PPE = personal protective equipment.

TABLE 4

Regression Results for Hygiene and Cleaning Measures

Country-level factors	1	2
Experience with previous pandemics	−0.31*	−0.28
	(0.16)	(0.19)
East Asia and Pacific	−0.14	−0.013
	(0.28)	(0.37)
Latin America and the Caribbean	2.11***	2.21**
	(0.65)	(0.96)
Sub-Saharan Africa	0.56	0.76
	(0.67)	(0.91)
Democracy index		−0.03
		(0.67)
Constant	0.99***	0.82
	(0.33)	(0.58)
Observations	49	38
R^2	.32	.28

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

TABLE 5

Regression Results for Physical Distancing Measures

Country-level factors	1	2
Experience with previous pandemics	−0.29	−0.28
	(0.27)	(0.26)
East Asia and Pacific	−0.11	0.38
	(0.39)	(0.32)
Latin America and the Caribbean	2.02	2.84
	(1.78)	(2.58)
Sub-Saharan Africa	1.02	1.95
	(1.46)	(1.98)
Democracy index		−0.05
		(0.61)
Constant	1.38***	1.04*
	(0.43)	(0.55)
Observations	49	38
R^2	.12	.20

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

the democracy index improved the R^2 for most models. For hygiene and cleaning, as well as the dissemination of information, we reported the baseline models. As aforementioned, some country measures were limited and not available for all countries, therefore we did not include them in our saturated model.

World Region. Hypothesis 1 predicted that countries in the same world region formulated measures from the same themes. World region, our variable for geographical proximity, was statistically significant for most basic and extended themes, with the single exception of the school schedule/ operations. Importantly, we observed that most of the variation in the number of measures per theme occurred within regions.

Central Asia, Europe, and North America. The prevalent themes in this region corresponded to hygiene and cleaning, physical distancing, PPE measures, and the dissemination of information regarding the COVID-19 pandemic. Interestingly, countries in this region also formulated measures related to the school schedule/operations, but the inclusion of the variable for democracy rendered these not statistically significant.

Latin America and the Caribbean. Countries in this region were most likely to formulate measures related to hygiene and cleaning and screening. At the same time, we found that countries in this region were also likely to formulate measures related to student social and emotional health policies and to formulate measures that directly support teachers and their specific training regarding the pandemic.

TABLE 6

Regression Results for Personal Protective Equipment Measures

Country-level factors	1	2
Experience with previous pandemics	0.15*	0.18**
	(0.08)	(0.07)
East Asia and Pacific	0.01	−0.18
	(0.13)	(0.24)
Latin America and the Caribbean	0.25	0.42
	(0.20)	(0.26)
Sub-Saharan Africa	0.38**	0.37
	(0.17)	(0.23)
Democracy index		−0.85
		(0.53)
Constant	0.15	0.79
	(0.09)	(0.47)
Observations	49	38
R^2	.14	.36

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

TABLE 7

Regression Results for Screening Measures

Country-level factors	1	2
Experience with previous pandemics	0.05	0.04
	(0.08)	(0.10)
East Asia and Pacific	0.10	0.05
	(0.10)	(0.15)
Latin America and the Caribbean	1.11**	1.67***
	(0.47)	(0.54)
Sub-Saharan Africa	1.04	1.19
	(0.79)	(1.11)
Democracy index		−0.33
		(0.32)
Constant	0.19**	0.44
	(0.08)	(0.29)
Observations	49	38
R^2	.20	.28

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

TABLE 8

Regression Results for Dissemination of Information Measures

Country-level factors	1	2
Experience with previous pandemics	−0.05	−0.05
	(0.03)	(0.04)
East Asia and Pacific	0.03	−0.01
	(0.06)	(0.05)
Latin America and the Caribbean	0.61	0.55
	(0.42)	(0.60)
Sub-Saharan Africa	0.15	0.13
	(0.15)	(0.20)
Democracy index		0.01
		(0.09)
Constant	0.09*	0.11
	(0.06)	(0.08)
Observations	49	38
R^2	.24	.19

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

TABLE 9

Regression Results for Student Social and Emotional Health Measures

Country-level factors	1	2
Experience with previous pandemics	0.01	−0.00
	(0.01)	(0.02)
East Asia and Pacific	0.02	0.04*
	(0.02)	(0.02)
Latin America and the Caribbean	0.50**	0.66**
	(0.21)	(0.30)
Sub-Saharan Africa	0.28*	0.30
	(0.14)	(0.19)
Democracy index		0.03
		(0.05)
Constant	0.00	−0.02
	(0.01)	(0.04)
Observations	49	38
R^2	.40	.48

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

East Asia and Pacific. Largely explained by the variation of policies within this region, which included Australia and New Zealand in addition to East Asian countries, we only found statistically significant results for the formulation of measures related to student social and emotional health.

Sub-Saharan Africa. We did not find any statistically significant results for the formulation of measures in this region. However, we observed that without the inclusion of the democracy index, the formulation of measures related to student social and emotional health was statistically significant.

Level of Democracy. While the inclusion of the measure of democracy improved the predictive power of most measures, it was only statistically significantly correlated with PPE measures. Specifically, increases in the level of democracy were related to decreases in the number of PPE-related measures. This finding aligns partially with Hypothesis 2 regarding the formulation of similar measures.

Income. Using statistical tests of means, we found statistically meaningful differences for PPE, screening, and social

TABLE 10
Regression Results for School Schedule and Operations Measures

Country-level factors	1	2
Experience with previous pandemics	−0.05	−0.03
	(0.10)	(0.12)
East Asia and Pacific	−0.04	0.12
	(0.22)	(0.36)
Latin America and the Caribbean	0.94	1.58
	(1.09)	(1.78)
Sub-Saharan Africa	−0.27	−0.15
	(0.17)	(0.21)
Democracy index		−0.17
		(0.65)
Constant	0.57***	0.56
	(0.14)	(0.55)
Observations	49	38
R^2	.11	.17

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

TABLE 11
Regression Results for General Health Measures

Country-level factors	1	2
Experience with previous pandemics	−0.01	−0.02
	(0.01)	(0.02)
East Asia and Pacific	0.02	0.02
	(0.01)	(0.02)
Latin America and the Caribbean	−0.1	−0.01
	(0.01)	(0.01)
Sub-Saharan Africa	0.21	0.29
	(0.14)	(0.19)
Democracy index		−0.00
		(0.04)
Constant	0.01	0.01
	(0.01)	(0.03)
Observations	49	38
R^2	.22	.32

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

TABLE 12
Regression Results for Teacher Support and Training Measures

Country-level factors	1	2
Experience with previous pandemics	−0.01	−0.01
	(0.04)	(0.04)
East Asia and Pacific	−0.04	0.02
	(0.05)	(0.03)
Latin America and the Caribbean	0.22	0.47*
	(0.20)	(0.26)
Sub-Saharan Africa	0.31	0.41
	(0.27)	(0.38)
Democracy index		0.02
		(0.06)
Constant	0.08	0.01
	(0.06)	(0.04)
Observations	49	38
R^2	.14	.24

Note. Robust standard errors in parentheses.
*$p < .1$. **$p < .05$. ***$p < .01$.

Experience With Past Pandemics. Our findings indicated that having experience with SARS and/or MERS related to the formulation of PPE-related measures. However, it decreased the number of measures related to hygiene/cleaning, which we found counterintuitive. Overall, however, these findings help confirm Hypothesis 4. Mitigation measures like PPE were indeed more successfully formulated in countries that have already used these mitigation strategies before. Perhaps the airborne nature of SARS-CoV2 influenced countries' decisions to promote the use of PPE in lieu of measures related to hygiene and cleaning.

Given the large scope of our study, we summarized the quantitative findings in Table 13. We also included the extent to which each hypothesis is supported by our findings.

Discussion

We find that countries formulated a wide range of school reopening policies and procedures to mitigate the spread of the virus in the early months of the COVID-19 pandemic. Differing greatly by broad themes, the cross-national diversity suggests the absence of universal applications of containment strategies. Instead, governments selected policies across a menu of options, most significantly from those we labeled Basic Measures themes and fewer from the Extended Measures. This aligns with how intergovernmental organizations such as UNESCO and UNICEF urged country responses to include key universal strategies for safe and equitable reopenings while also underscoring that their specific policies must be contextualized and best practices adapted to fit each national setting (UNESCO et al., 2020).

These understandings are further strengthened by the findings from the quantitative analyses, which reveal, based
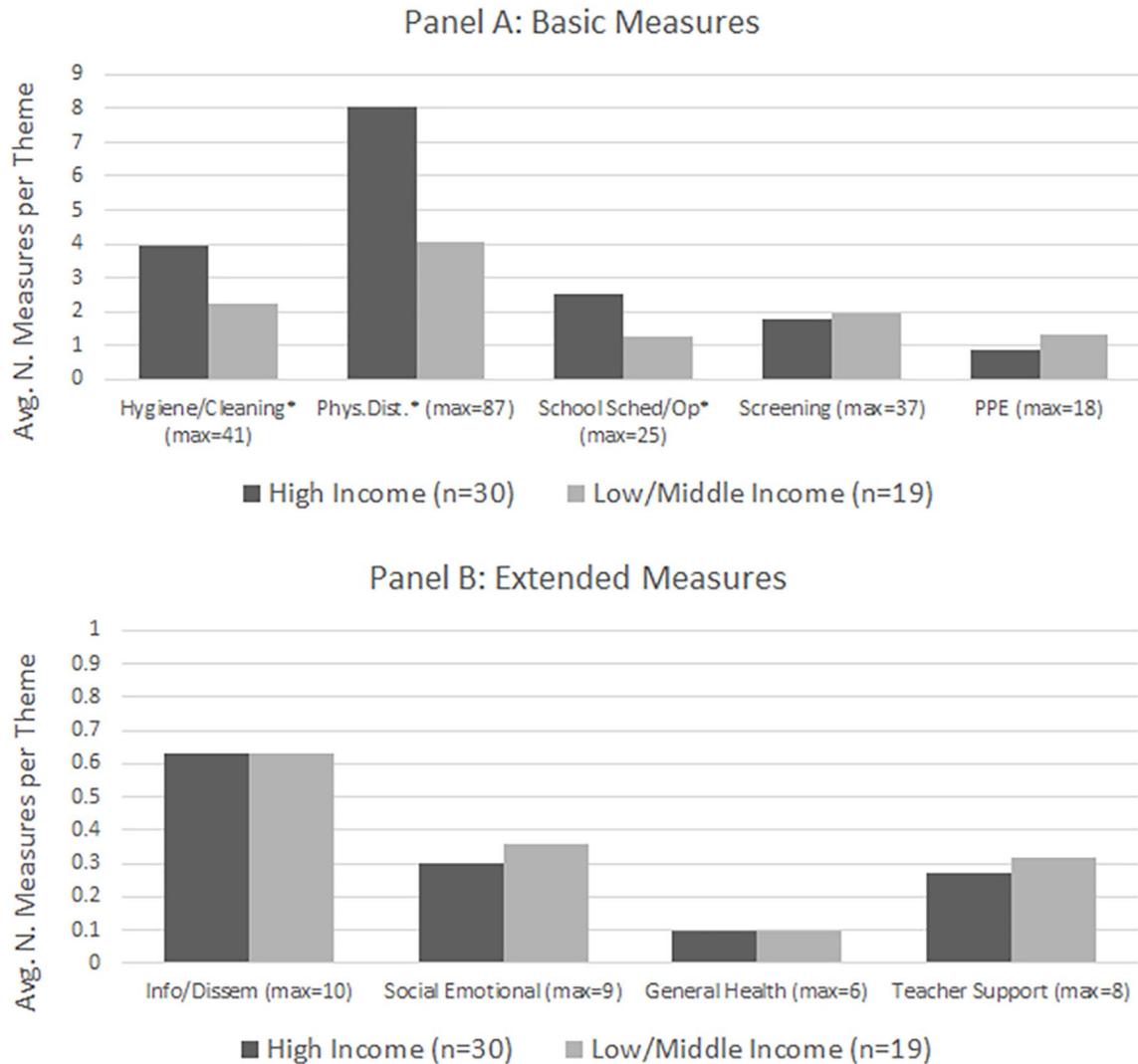
and emotional health measures with high-income countries more likely to formulate such policies (see Figure 1). High-income countries reported, on average, eight of the 87 physical distancing measures, four of the 41 hygiene/cleaning measures, and two of the 25 school schedule/operations measures. Low-/middle-income countries reported, on average, two of the hygiene/cleaning measures, four of the physical distancing measures, and one school schedule/operations measure. Our results thus support Hypothesis 3. Our findings suggest that the costly nature of virus control strategies in school settings bounds country's decision-making processes.

Panel A: Basic Measures

Panel B: Extended Measures

FIGURE 1.   *School/classroom redesign measures by income group (N = 49 countries).*

Note. Country income groups are based on the World Bank categories for 2020–2010 where "High Income" means a gross national income per capita of over 12,535 current USD (see https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021). One country, Cook Islands, does not report gross national income and we placed it into the "High" income category based on the similarity of per capita gross domestic product with others in that group. Countries in high income group ($n = 30$) include Aruba, Australia, Austria, Barbados, Belgium, Canada, Channel Islands, Cook Islands, Cyprus, Czech Republic, Denmark, England, Faroe Islands, Finland, France, Germany, Greece, Greenland, Hong Kong, Iceland, Israel, Japan, Luxembourg, Netherlands, New Zealand, Norway, Singapore, South Korea, Switzerland, and Uruguay. Countries in low/middle income group ($n = 19$) include Belarus, Benin, China, Côte d'Ivoire, Gambia, Ghana, Grenada, Indonesia, Iran, Jamaica, Liberia, Madagascar, Malaysia, Marshall Islands, South Africa, Thailand, Tonga, Vanuatu, and Vietnam.

*Indicates statistically significant difference between means at the .05 level or lower using a two-tailed *t* test.

on complexity theory arguments, that cross-national diversity in policies is related to internal country factors such as income and past pandemic experience. Policy makers may have not merely formulated interventions utilized elsewhere but instead we find evidence to support Angeli and Montefusco's (2020) argument that containment policies cannot be wholly understood outside of each country's respective socioeconomic and sociocultural contexts. Notably, these findings have potential implications for inequality, as we find disparities about the use of Basic

Measures between high- and low-/middle-income countries. The significantly different emphases across country income groups could result in differences in school-based COVID-19 outbreaks or student learning outcomes.

We also find that the cross-national variance in school reopening measures is partially explained by external country factors and by policy diffusion theories of peer emulation due to geographic and political proximity. These findings complicate the understanding that a country's school reopening designs are responsive to their national

TABLE 13

Summary of the Quantitative Findings by Hypothesis

Theory/rationale	Hypothesis	Measure(s)	Supported, partially supported or not supported	Conclusion of key findings
Policy diffusion: geographic proximity	H1: Countries in the same world region formulated measures from the same themes.	World region	Partially supported	Countries in the same world region adopted measures from the same themes.
Policy diffusion: political proximity	H2: Countries that are more democratic formulated measures from the same themes.	Level of democracy	Partially supported	Increases in the level of democracy led to a decrease in the number of implemented PPE-related measures.
Complexity theory: socioeconomic context	H3: Countries with higher income levels formulated more measures across more themes.	Income level by GDP	Supported	The costly nature of virus control strategies in school settings bounds countries' decision-making processes.
Complexity theory: sociocultural context	H4: Countries that have experienced respiratory virus pandemics formulated measures from the same themes.	Past pandemic experience with SARS and MERS	Supported	Mitigation measures like PPE are indeed more successfully implemented in countries that have already used these mitigation strategies before.

Note. H = hypothesis; PPE = personal protective equipment; GDP = gross domestic product.

context. Rather they suggest that imitation through geographic proximity likely occurred given the uncertainty of accurate information during the pandemic. Governments mimic the policy choices of their regional neighbors leading to the emergence of political clusters formulating similar measures. Moreover, we argue that "peer effects" are indeed important drivers of government formulation of some measures. At the same time, we find that countries with similar political systems are more likely to formulate measures with the same level of stringency. In this case, these policies relate to the use of PPE rather than social distancing. As we hypothesized, it is not the case that more democratic countries formulate more measures, but rather, are more likely to devise similar measures, that is, within the same theme. With respect to "individual-level interventions," including social distancing, hand hygiene, and use of PPE, we find it unsurprising that democratic countries were less likely to mandate students wear facial coverings (National Academies of Sciences, Engineering, and Medicine, 2020, p. 18). Similar to the finding by Lundgren et al. (2020) regarding SOE declarations, this is because PPE mandates are often considered imposing or restrictive in these societies and thus politically costly. Ultimately, although there was still great within-region variation and political emulation appears evident with regard only to PPE measures, there are still important implications of these findings. What is concerning about the diffusion of policies by peer emulation is that countries may have formulated measures that were ineffective, or potentially harmful, because other countries did so. We agree with Mistur et al. (2020) that emulation may not have only

shaped the global policy response, but "as a consequence, the health and economic impacts of COVID-19" (p. 24).

Although our analysis cannot speak to the efficacy of the various measures implemented around the world, many recent studies do shed light on this topic. There is empirical evidence to support measures adopted by several countries in our study such as reopening schools to younger students first (Walger et al., 2020), self-reporting of symptoms (Menni et al., 2020), physical distancing, disinfection of surfaces, and increased ventilation (Chu et al., 2020; Ratnesar-Shumate et al., 2020; Somsen et al., 2020). On the other hand, temperature screening, a measure formulated by 16 countries in our study, seems to be an ineffective (or much less effective) strategy for detecting COVID-19 carriers (Mitra et al., 2020; National Academies of Sciences, Engineering, and Medicine, 2020). Research also points to gaps in school redesign plans. Multiple models suggest that widespread rapid testing is one of the most critical components of an effective containment strategy, yet this measure was only observed in seven countries in our study (Landeros et al., 2020; Mukherjee et al., 2020).

Our study faces several limitations. First, our findings are only as comprehensive as the information available in public documents available in English at the time of the data collection. In addition, including the index for democracy excludes countries in Latin America and the Caribbean and Sub-Saharan Africa, which in turn limits the scope of the implications of our findings. Furthermore, weighting the number of measures by the number of documents per country reduced the magnitude of our findings in terms of number of measures.

In addition, we recommend examining other variables. For example, we produced a measure of right-wing political parties in power, but because only five countries in our data set fell in this category, we were not able to analyze the relationship between right-wing alignment and school reopening measures, which says something about the kinds of countries that decided to reopen schools or made plans to do so. We also considered measures for trust in government and other ways to ascertain culture, namely individualistic versus collectivist cultures. However, given limited data availability, we were unable to utilize these in our analyses. Future studies could examine these factors to determine if they explain differences in school reopening measures formulated within the United States during the Trump and Biden administrations. Finally, we acknowledge that it is important to consider the governance structures of countries' education systems. Governments may respond to COVID-19 with respect to education in varying ways depending on whether the federal/national government possesses the relevant responsibilities as with centralized education system or if, in the case of decentralized systems, local governments share broad responsibilities for determining and delivering education policy (Allain-Dupré et al., 2020).

Our findings evince the need for more explicit guidelines for school reopenings. Specifically, these guidelines should include information regarding the efficiency of each measure. In addition, these guidelines should discourage the formulation of measures by emulation only, such as temperature screenings, and increase the formulation of measures found to be more efficient, e.g., the use of PPE. Moreover, we consider that the United Nations system alongside donor agencies must provide the same kinds of measures used in wealthier countries, particularly if there is evidence that those measures are more effective. Differences in the formulated measures between low-income and wealthy countries can increase the already growing gaps across countries with devastating effects for educational outcomes.

In addition, our findings point to broader areas of under-emphasis— namely, that Extended Measures are discussed less often. Schools, students, teachers, and staff are not isolated from their communities, and the likelihood that COVID-19 will spread despite use of efficacious school-based measures remains (National Academies of Sciences, Engineering, and Medicine, 2020). Those themes that view students, teachers, and community members holistically (extending beyond viral containment) will be increasingly needed as the pandemic extends on for longer than anyone had imagined.

Conclusion

When 90% of the world's children had their education disrupted due to the COVID-19 pandemic, countries were urged to reopen safely (Giannini et al., 2020) so as to stave off negative consequences of school closures (Christakis, 2020; Kuhfeld & Tarasawa, 2020; Sheikh et al., 2020). How to do so and what measures to take proved challenging, but within a few months, over 50 countries had formulated policies to reopen schools. Our study provides one of the most systematic worldwide analyses of the data available on mitigation measures utilized during the initial phase of school reopenings around the world.

Our findings have important insights in the short term for practitioners and policy makers crafting plans for virus containment strategies in school settings during the ongoing COVID-19 pandemic, as well as lay the foundation for future work regarding education policy in times of global uncertainty. With respect to the research community, we also present a possible path for future studies to leverage cross-national variation in country responses to global health crises. Additional studies can strengthen these findings by continually examining changes as schools undergo constant closures and reopenings. Ultimately, as school reopening measures, and now ongoing school redesign measures continue to diffuse, researchers, policy makers, and practitioners should be wary of equating prevalence or alignment with preexisting cultural norms with effectiveness and instead work together to develop evidence-based guidelines and systems that can be monitored and evaluated in the long term.

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Notes

1. Over time, these counts have increased dramatically and continue to change rapidly, posing an ongoing disruption to education and a threat to human safety. At the time of this article's submission in March 2021, a year after many initial school closures, the World Health Organization reported that there had been over 116 million confirmed cases and more than 2.5 million attributable deaths due to COVID-19 (World Health Organization, 2021).

2. Since the first wave of COVID-19, the understanding of the medical and scientific communities has evolved. Studies conducted in the early stage of the pandemic "suggested that children do not contribute much to the spread of coronavirus," while research conducted months later has generally "raise[d] concerns that children could be capable of spreading the infection" (Harvard Medical School, 2021).

3. Excluded countries with similar redesign measures but that did not formally close its schools include Nicaragua, Sweden, Taiwan, and Turkmenistan. Additionally, countries that had outlined policies for upcoming school reopening (post July 15, 2020) that had not yet been formulated were also not included in our study.

4. In addition to these 105 documents, we found 15 additional documents that we did not include in the analyses because they were not in English and we were unable to translate them during the collection and analysis period.

5. In addition to the 242 measures, a handful of "negative" mentions were excluded as there were not enough instances of them for separate analyses. Examples of these include "masks not required" and "physical distancing not required." A full list of observed "negative" mentions is available from the authors on request.

6. As defined by Shipan and Volden (2012, pp. 789–791), these policy-specific terms are defined as follows: Learning is when policy makers act as "scientists" watching the "experiments" played out in other countries and learning from their results to "solve one's own policy problems;" competition refers to governments, as in a free market, creating policies to attract residents who are sorting themselves based on their "preferences;" coercion can be "considered a top-down version of policy diffusion;" and finally imitation/emulation/mimicry suggests a government's "copying of another government's policies without concern for those policies' effects." It is important to note that these policy diffusion mechanisms are not mutually exclusive (Braithwaite & Jeong, 2017).

References

Allain-Dupré, D., Chatry, I., Kornprobst, A., & Michalun, M.-V. (2020). *The territorial impact of COVID-19: Managing the crisis across levels of government*. OECD. https://read.oecd-ilibrary.org/view/?ref=128_128287-5agkkojaaa&title=The-territorial-impact-of-covid-19-managing-the-crisis-across-levels-of-government

Altheide, D., Coyle, M., DeVriese, K., & Schneider, C. (2008). Emergent qualitative document analysis. In S. N. Hesse-Biber & P. Leavy (Eds.), *Handbook of emergent methods* (pp. 127–151). Guilford Press.

Angeli, F., & Montefusco, A. (2020). Sensemaking and learning during the Covid-19 pandemic: A complex adaptive systems perspective on policy decision-making. *World Development*, *136*, Article 105106. https://doi.org/10.1016/j.worlddev.2020.105106

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, *9*(2), 27–40. https://doi.org/10.3316/QRJ0902027

Braithwaite, A., & Jeong, S. (2017). Diffusion in international politics. In W. R. Thompson (Eds.), *Oxford research encyclopedia of politics*. Oxford University Press. https://doi.org/10.1093/acrefore/9780190228637.013.548

CDC COVID-19 Response Team. (2020). Coronavirus disease 2019 in children: United States, February 12–April 2, 2020. *Morbidity and Mortality Weekly Report*, *69*(14), 422–426. https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e4.htm?s_cid=mm6914e4_w

Center for Global Development. (2020). *CGD: COVID education policy tracking*. https://docs.google.com/spreadsheets/d/1ndHgP53atJ5J-EtxgWcpSfYG8LdzHpUsnb6mWybErYg/edit#gid=0

Chavatzia, T., & Watanabe, M. (2020). *Preparing the reopening of schools*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000373401?web=1

Chng, S. Y., Chia, F., Leong, K. K., Kwang, Y. P., Ma, S., Lee, B. W., Vaithinathan, R., & Tan, C. C. (2004). Mandatory temperature monitoring in schools during SARS. *Archives of Disease in Childhood*, *89*(8), 738–739. https://doi.org/10.1136/adc.2003.047084

Christakis, D. A. (2020). School reopening: The pandemic issue that is not getting its due. *JAMA Pediatrics*, *174*(10), 928. https://doi.org/10.1001/jamapediatrics.2020.2068

Chu, D. K., Akl, E. A., Duda, S., Solo, K., Yaacoub, S., Schünemann, H. J., El-harakeh, A., Bognanni, A., Lotfi, T., Loeb, M., Hajizadeh, A., Bak, A., Izcovich, A., Cuello-Garcia, C. A., Chen, C., Harris, D. J., Borowiack, E., Chamseddine, F., Schünemann, F., . . . Reinap, M. (2020). Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: A systematic review and meta-analysis. *Lancet*, *395*(10242), 1973–1987. https://doi.org/10.1016/S0140-6736(20)31142-9

Coppedge, M., Gerring, J., Knutsen, C. H., Lindberg, S. I., Teorell, J., Altman, D., Bernhard, M., Fish, M. S., Glynn, A., Hicken, A., Luhrmann, A., Marquardt, K. L., McMann, K., Paxton, P., Pemstein, D., Seim, B., Sigman, R., Skaaning, S., Staton, J., . . . Ziblatt, D. (2020). *V-Dem: Varieties of Democracy* (V-Dem Dataset—Version 10) [Data set]. V-Dem Institute. https://doi.org/10.23696/vdemds20

Dalglish, S. L., Khalid., H., & McMahon, S. A. (2020). Document analysis in health policy research: The READ approach. *Health Policy and Planning*, *35*(10), 1423–1431. https://doi.org/10.1093/heapol/czaa064

Davies, N. G., Klepac, P., Liu, Y., Prem, K., Jit, M., CMMID COVID-19 Working Group, & Eggo, R. M. (2020). Age-dependent effects in the transmission and control of COVID-19 epidemics. *Nature Medicine*, *26*(8), 1205–1211. https://doi.org/10.1038/s41591-020-0962-9

Donohue, J. M., & Miller, E. (2020). COVID-19 and school closures. *JAMA*, *324*(9), 845–847. https://doi.org/10.1001/jama.2020.13092

Esposito, S., & Principi, N. (2020). School closure during the coronavirus disease 2019 (COVID-19) pandemic an effective intervention at the global level? *JAMA Pediatrics*, *174*(10), 921–922. https://doi.org/10.1093/cid/ciaa344

Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, *5*(1), 80–92. https://doi.org/10.1177/160940690600500107

Fischhoff, B. (2020). Making decisions in a COVID-19 world. *JAMA Journal of the American Medical Association*, *324*(2), 139–140. https://doi.org/10.1001/jama.2020.10178

Gao, J., Yin, Y., Jones, B. F., & Wang, D. (2020). *Quantifying policy responses to a global emergency: Insights from the COVID-19 pandemic*. SSRN. https://doi.org/10.2139/ssrn.3634820

Giannini, S., Jenkins, R., & Saavedra, J. (2020, May 13). *Reopening schools: When, where and how?* UNESCO. https://en.unesco.org/news/reopening-schools-when-where-and-how

Guthrie, B. L., Tordoff, D. M., Meisner, J., Tolentino, L., Jiang, W., Fuller, S., Green, D., Louden, D., & Ross, J. M. (2020). *Summary of school reopening models and implementation approaches during the COVID 19 pandemic*. Washington State Department of Health, Metacenter for Pandemic Preparedness, & START Center. https://globalhealth.washington.edu/sites/default/files/COVID-19%20Schools%20Summary%20%28updated%29.pdf

Harvard Medical School. (2021, March 3). *Coronavirus outbreak and kids: Advice on playdates, physical distancing, and healthy behaviors to help prevent infection*. https://www.health.harvard.edu/diseases-and-conditions/coronavirus-outbreak-and-kids

Huang, J., Teoh, J. Y. C., Wong, S. H., & Wong, M. C. S. (2020). The potential impact of previous exposure to SARS or MERS on control of the COVID-19 pandemic. *European Journal of Epidemiology*, *35*(11), 1099–1103. https://doi.org/10.1007/s10654-020-00674-9

Kuhfeld, M., & Tarasawa, B. (2020). *The COVID-19 slide: What summer learning loss can tell us about the potential impact of school closures on student academic achievement*. NWEA. https://www.nwea.org/content/uploads/2020/05/Collaborative-Brief_Covid19-Slide-APR20.pdf

Landeros, A., Ji, X., Lange, K. L., Stutz, T. C., Xu, J., Sehl, M. E., & Sinsheimer, J. S. (2020). An examination of school reopening strategies during the SARS-CoV-2 pandemic. *MedRxiv*. https://doi.org/10.1101/2020.08.05.20169086

Lee, A., Cheng, F. F. K., Yuen, H., & Ho, M., & the Hong Kong Healthy Schools Support Group. (2003). How would schools step up public health measures to control spread of SARS? *Journal of Epidemiology & Community Health*, *57*(12), 945–949. https://doi.org/10.1136/jech.57.12.945

Lee, B., & Raszka, W. V. (2020). COVID-19 Transmission and children: The child is not to blame. *Pediatrics*, *146*(2), e2020004879. https://doi.org/10.1542/peds.2020-004879

Lordan, R., FitzGerald, G. A., & Grosser, T. (2020). Reopening schools during COVID-19. *Science*, *369*(6508), 1146. https://doi.org/10.1126/science.abe5765

Lu, X., Zhang, L., Du, H., Zhang, J., Li, Y. Y., Qu, J., Zhang, W., Wang, Y., Bao, S., Li, Y., Wu, C., Liu, H., Liu, D., Shao, J., Peng, X., Yang, Y., Liu, Z., Xiang, Y., Zhang, F., . . . Wong, G. W. K. (2020). SARS-CoV-2 infection in children. *New England Journal of Medicine*, *382*(17), 1663–1665. https://doi.org/10.1056/NEJMc2005073

Lundgren, M., Klamberg, M., Sundström, K., & Dahlqvist, J. (2020). *Emergency powers in response to COVID-19: Policy Diffusion, democracy, and preparedness*. SSRN. https://doi.org/10.2139/ssrn.3641384

Melnick, H., & Darling-Hammond, L. (2020). *Reopening schools in the context of COVID-19: Health and safety guidelines from other countries*. Learning Policy Institute. https://learningpolicyinstitute.org/product/reopening-schools-covid-19-brief

Menni, C., Valdes, A. M., Freidin, M. B., Sudre, C. H., Nguyen, L. H., Drew, D. A., Ganesh, S., Varsavsky, T., Cardoso, M. J., El-Sayed Moustafa, J. S., Visconti, A., Hysi, P., Bowyer, R. C. E., Mangino, M., Falchi, M., Wolf, J., Ourselin, S., Chan, A. T., Steves, C. J., & Spector, T. D. (2020). Real-time tracking of self-reported symptoms to predict potential COVID-19. *Nature Medicine*, *26*(7), 1037–1040. https://doi.org/10.1038/s41591-020-0916-2

Milne, G. J., & Xie, S. (2020). The effectiveness of social distancing in mitigating Covid-19 spread: A modelling analysis. *MedRxiv*. https://doi.org/10.1101/2020.03.20.20040055

Mistur, E., Givens, J. W., & Matisoff, D. (2020). *Policy contagion during a pandemic*. SSRN. https://doi.org/10.2139/ssrn.3662444

Mitra, B., Luckhoff, C., Mitchell, R. D., O'Reilly, G. M., Smit, D. V., & Cameron, P. A. (2020). Temperature screening has negligible value for control of COVID-19. *Emergency Medicine Australasia*, *32*(5), 867–869. https://doi.org/10.1111/1742-6723.13578

Morel, B., & Ramanujam, R. (1999). Through the looking glass of complexity: The dynamics of organizations as adaptive and evolving systems. *Organization Science*, *10*(3), 278–293. https://doi.org/10.1287/orsc.10.3.278

Mukherjee, U. K., Bose, S., Ivanov, A., Souyris, S., Seshadri, S., Sridhar, P., Watkins, R., & Xu, Y. (2020). An evaluation of educational institutions safe reopening strategies for in-person classes amid the COVID-19 pandemic. *MedRxiv*. https://doi.org/10.1101/2020.09.04.20188680

National Academies of Sciences, Engineering, and Medicine. (2020). *Reopening K-12 schools during the COVID-19 pandemic: Prioritizing health, equity, and communities*. National Academies Press. https://doi.org/10.17226/25858

Nazif-Munoz, J. I., Oulhote, Y., & Pena, S. (2020). The global viralization of policies to contain the spreading of the COVID-19 pandemic: Analyses of school closures and first reported cases. *MedRxiv*. https://doi.org/10.1101/2020.06.11.20128892

Ratnesar-Shumate, S., Williams, G., Green, B., Krause, M., Holland, B., Wood, S., Bohannon, J., Boydston, J., Freeburger, D., Hooper, I., Beck, K., Yeager, J., Altamura, L. A., Biryukov, J., Yolitz, J., Schuit, M., Wahl, V., Hevey, M., & Dabisch, P. (2020). Simulated sunlight rapidly inactivates SARS-CoV-2 on surfaces. *Journal of Infectious Diseases*, *222*(2), 214–222. https://doi.org/10.1093/infdis/jiaa274

Sebhatu, A., Wennberg, K., Arora-Jonsson, S., & Lindberg, S. I. (2020). Explaining the homogeneous diffusion of COVID-19 nonpharmaceutical interventions across heterogeneous countries. *Proceedings of the National Academy of Sciences of the United States of America*, *117*(35), 21201–21208. https://doi.org/10.1073/pnas.2010625117

Sheikh, A., Sheikh, A., Sheikh, Z., & Dhami, S. (2020). Reopening schools after the COVID-19 lockdown. *Journal of Global Health*, *10*(1), 1–3. https://doi.org/10.7189/JOGH.10.010376

Shipan, C. R., & Volden, C. (2008). The mechanisms of policy diffusion. *American Journal of Political Science*, *52*(4), 840–857. https://doi.org/10.1111/j.1540-5907.2008.00346.x

Shipan, C. R., & Volden, C. (2012). Policy diffusion: Seven lessons for scholars and practitioners. *Public Administration Review*, *72*(6), 788–796. https://doi.org/10.1111/j.1540-6210.2012.02610.x

Silverman, M., Sibbald, R., & Stranges, S. (2020). Ethics of COVID-19-related school closures. *Canadian Journal of Public*

Health, *111*(4), 462–465. https://doi.org/10.17269/s41997-020-00396-1

Somsen, G. A., van Rijn, C., Kooij, S., Bem, R. A., & Bonn, D. (2020). Small droplet aerosols in poorly ventilated spaces and SARS-CoV-2 transmission. *Lancet Respiratory Medicine*, *8*(7), 658–659. https://doi.org/10.1016/S2213-2600(20)30245-9

Strang, D., & Meyer, J. W. (1993). Institutional conditions for diffusion. *Theory and Society*, *22*(4), 487–511. https://doi.org/10.1007/BF00993595

Tan, C.-C. (2006). SARS in Singapore: Key lessons from an epidemic. *Annals of the Academy of Medicine Singapore*, *35*(5), 345–349. https://pubmed.ncbi.nlm.nih.gov/16830002/

UNESCO. (2020). *Education: From disruption to recovery. Global tracking of COVID-19 caused school closures and re-openings*. https://en.unesco.org/covid19/educationresponse

UNESCO, United Nations Children Fund, The World Bank, & World Food Programme. (2020). *Framework for reopening schools*. https://unesdoc.unesco.org/ark:/48223/pf0000373348

Walger, P., Heininger, U., Knuf, M., Exner, M., Popp, W., Fischbach, T., Trapp, S., Herr, C., & Simon, A., German Society for Hospital Hygiene, German Society for Pediatric Infectious Diseases, German Academy for Pediatric and Adolescent Medicine (DAKJ), Society of Hygiene, Environmental and Public Health Sciences, & Professional Association of Pediatricians in Germany. (2020). Children and adolescents in the CoVid-19 pandemic: Schools and daycare centers are to be opened again without restrictions. The protection of teachers, educators, carers and parents and the general hygiene rules do not conflict with this. *GMS Hygiene and Infection Control*, *15*. Advance online publication. https://doi.org/10.3205/dgkh000346

Wilder-Smith, A., Chiew, C. J., & Lee, V. J. (2020). Can we contain the COVID-19 outbreak with the same measures as for SARS? *Lancet Infectious Diseases*, *20*(5), e102–e107. https://doi.org/10.1016/S1473-3099(20)30129-8

The World Bank. (2021). *World Development Indicators: The World by income and region*. https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html

World Health Organization. (2021). *WHO COVID-19 Dashboard*. Geneva. https://covid19.who.int/

Zimmermann, P., & Curtis, N. (2020). Why is COVID-19 less severe in children? A review of the proposed mechanisms underlying the age-related difference in severity of SARS-CoV-2 infections. *Archives of Disease in Childhood*. Advance online publication. https://doi.org/10.1136/archdischild-2020-320338

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