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The Role of Professional Development and Technical Assistance in Supporting Implementation of COVID-19 Prevention Strategies in K-12 Schools

Syreeta Skelton-Wilson, PhD, MPA,

Sarah Lee, PhD, MPH,

Jessica Potts, MPH,

Chloe Chung, MPH,

Seraphine Pitt-Barnes, PhD,

Melissa Fahrenbruch, MEd,

Forest Ogunyankin, MPH,

Dana Keener Mast, PhD

ICF, Reston, Virginia (Dr Skelton-Wilson, Mr Ogunyankin, and Dr Keener Mast); Centers for Disease Control and Prevention, Atlanta, Georgia (Dr Lee, Ms Chung, Dr Pitt-Barnes, and Ms Fahrenbruch); and Emory Centers for Public Health Training and Technical Assistance, Atlanta, Georgia, Atlanta, Georgia (Ms Potts).

Abstract

Context: Schools vary in their capacity to implement recommended strategies to prevent infectious diseases, such as COVID-19. Professional development (PD) and technical assistance (TA) are well-established tools used to strengthen school capacity and infrastructure for healthier school environments.

Objective: The authors examined the relationship between PD and TA received by districts and schools and their implementation of COVID-19 prevention strategies during the 2020–2021 school year.

Design and Setting: We conducted a descriptive analysis of survey responses collected during Spring 2021 from selected districts and schools in 9 participating states. The survey assessed the implementation of 10 COVID-19 prevention strategies recommended by the Centers for Disease

Correspondence: Dana Keener Mast, PhD, 2635 Century Center Parkway, Suite 1000, Atlanta, GA 30345 (dana.keenermast@icf.com).

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We deeply appreciate the state education agency staff who distributed surveys to districts and schools in 9 states including Alaska, Arkansas, Arizona, Kentucky, Missouri, Nebraska, Oklahoma, Oregon, and Tennessee. We also thank the district and school staff who responded to the surveys.

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Control and Prevention and whether district or school staff received PD and/or TA on topics related to COVID-19 during the same year.

Participants: Survey responses were received from designated contacts in 310 districts and 931 schools across 9 states.

Main Outcome Measures: The dependent variable was the number of COVID-19 prevention strategies that were reported as “in place” by each district and school ranging from 0 to 10.

Results: On average, districts and schools reported implementing 7 of 10 recommended COVID-19 prevention strategies during the 2020–2021 school year. Schools that received PD on at least 1 of 12 topics reported implementing 7.61 COVID-19 prevention strategies, whereas schools that did not receive PD reported implementing 6.34 strategies. Similarly, schools that received TA on at least 1 topic reported higher COVID-19 implementation scores (7.51) than schools that did not receive any TA (7.20).

Conclusions: Findings reveal a positive relationship between receiving PD and/or TA and implementation of COVID-19 prevention strategies in school settings.

Keywords

COVID-19 mitigation; implementation; prevention; professional development; technical assistance; training

Introduction

With over 50 million children attending public schools in the United States,¹ schools play a critical role in mitigating transmission of coronavirus disease 2019 (COVID-19) and other infectious diseases. The adverse effects of widespread school closures for students such as learning loss and social isolation are well-documented and highlight the essential need for schools to operate safely and in person.^{2,3}

The US Centers for Disease Control and Prevention (CDC) outlines COVID-19 operational guidance for K-12 schools and early care education programs to prevent transmission of COVID-19 in education settings.⁴ At the height of the pandemic, the guidance addressed prevention strategies such as mask wearing; social and physical distancing; hand hygiene and respiratory etiquette; cleaning and disinfection; contact tracing and surveillance; communication and information sharing; and emergency operations planning (see Table 1 for a list of COVID-19 prevention strategies recommended during the 2020–2021 school year). When implemented correctly and consistently, layered strategies were shown to reduce the risk of COVID-19 transmission in schools.^{5,6} CDC updated guidance for schools over the course of the pandemic to reflect new evidence and adjust for the evolving nature of the pandemic.

Implementation studies of COVID-19 prevention strategies in schools, although limited, show that schools vary widely in their capacity to implement mitigation strategies effectively. For example, one study of a test-to-stay strategy in California found that only 1 in 5 eligible schools adopted the program due to resource limitations.⁷ Another study of disinfectant use by school staff found frequent use of disinfectants but noted implementation

concerns related to “contact time” and child exposure.⁸ A study of ventilation improvements in K-12 schools found differences in ventilation strategies employed by schools based on poverty level and location.⁹

Such findings suggest that schools may need support to implement recommended strategies designed to prevent transmission of COVID-19 and other infectious diseases while operating in person. Professional development (PD) and technical assistance (TA) are long-standing strategies used by CDC to support the implementation of school-based health interventions prior to the COVID-19 pandemic.¹⁰ PD is defined as a consciously designed, systematic process that strengthens how staff obtain, retain, and apply knowledge, skills, and attitudes.¹¹ TA is one form of PD that provides tailored guidance to 1 or more sites through direct collaboration with a specialist, typically provided through phone, email, or in-person consultations.¹¹

Research demonstrates that PD and TA can be effective tools for increasing school and staff capacity for achieving a range of academic-, climate-, and health-related aims. For example, PD and TA have been shown to improve classroom instruction¹²; increase curriculum fidelity¹³; strengthen teacher competence and confidence^{14,15}; and expand access to quality health and physical education.¹⁶ PD participation along with other school- and teacher-level factors influenced teachers’ classroom school-based practices and associated these practices with student performance.¹⁷

While evidence to support PD and TA overall continues to grow, little is known about the effectiveness of PD and TA in supporting the implementation of COVID-19 mitigation strategies in school settings. To address this gap, authors used data collected for an evaluation of the CDC’s Healthy Schools program¹⁰ to examine the relationship between PD and TA received by districts and schools and their implementation of 10 COVID-19 prevention strategies in K-12 school settings during the first full school year of the pandemic. Now that the COVID-19 pandemic has abated, the findings presented in this paper have continuing implications for the role of PD and TA in managing the spread of infectious diseases and advancing public health aims in school settings.

Centers for Disease Control and Prevention’s Healthy School program and COVID-19 supplement

CDC’s Healthy Schools program funded 16 state education agencies (SEAs) in 2018 to build and promote healthier school environments over 5 years. Funded states delivered PD and TA to districts and schools to support improvements in school nutrition, physical education and activity, and management of chronic conditions among students. In 2020, the CDC awarded \$6.9 million in COVID-19 supplemental funding to existing awardees of CDC’s Healthy Schools Initiative to support dissemination and implementation of CDC’s COVID-19 guidance for K-12 schools. States used the supplemental funds to deliver COVID-19-related PD and TA through in-person and virtual self-paced and real-time formats. During the 2020–2021 school year, funded states delivered 1220 PD events and 1796 TA events on topics related to preventing COVID-19 in schools. Each state determined the specific topics, audiences, and formats of PD and TA delivered based on their state’s

needs, priorities, and political landscape. States engaged training cadres and national and state organizations to deliver PD and TA.

Methods

All 16 SEA awardees of CDC's Healthy Schools Initiative and COVID-19 supplement were invited to distribute a web-based survey to a random sample of districts and schools in their state in Spring 2021 as part of an evaluation of CDC's Healthy Schools Initiative. Nine awardees agreed to administer the survey. Seven awardees declined to participate due to the intensive demands on district and school personnel during the pandemic. The evaluation protocol was reviewed and determined not to be human subjects research by the ICF Institutional Review Board (IRB FWA00002349) prior to initiating data collection.

Sampling approaches

The sampling approach used among the 9 participating states varied by state and was largely driven by state preferences. In 4 states, the survey was sent to a stratified, random sample of 30% of all districts and schools in the state drawn by the national evaluation team. Two states opted to administer the survey to all districts and schools in their respective states. Three states selected their own sample of districts and schools to receive the survey.

Survey instruments

The district and school surveys measured the implementation of 10 strategies to prevent COVID-19 (Table 1) aligned with the CDC's operational guidance for school settings in effect as of October 29, 2020.⁴ For each item, respondents were asked to indicate the extent to which the prevention activity was implemented during the 2020–2021 school year from 4 choices: not in place, planning, partially in place, or in place. Using a binary checklist, the surveys also asked respondents to indicate if they or others in their district/school received any PD and/or one-on-one TA on each of 12 topics to support implementation of COVID-19 prevention strategies, such as “procedures for isolating sick individuals safely,” “maintaining appropriate social distance during meals,” and “addressing the social, emotional, and mental health needs of students during and after school closures” (see Table 3 for a full list of measured PD and TA topics). The survey did not measure the quantity or quality of the PD or TA received.

Survey administration and response rates

The web-based survey was administered to selected district and school personnel between March and June 2021. Survey invitations were emailed to district superintendents and school principals requesting them to forward the invitation with a link to the survey to the district or school staff member primarily responsible for leading and/or coordinating COVID-19 response efforts for the district or school. Some states opted to send the invitations to contacts directly from SEA personnel for increased recognition of the sender. Other states preferred that a member of the national evaluation team send the invitations to districts and schools in their state.

In total, the surveys were sent to 1313 districts and 5988 schools across the 9 participating states. Responses were received from 310 districts and 931 K-12 schools, yielding 24% and 16% response rates, respectively. The average survey response time was 19.5 minutes for both districts and schools.

Analyses

Responses to each of the 10 prevention strategies identified by CDC were recoded into 10 dichotomous variables. Districts and schools that reported a strategy as “in place” were coded as 1, and districts and schools that reported the strategy as “not in place,” “planning,” or “partially in place” were coded as 0; missing responses were excluded. COVID-19 prevention implementation scores were computed as the sum of the 10 dichotomous variables, ranging from 0 to 10.

Dichotomous variables were created for PD received on any 1 or more of 12 topics (yes/no), TA received on any 1 or more of 12 topics (yes/no), PD received on each of 12 individual PD topics (yes/no), and TA received on each of 12 individual TA topics (yes/no) for each survey respondent.

Frequencies, means, and standard deviations were computed for each variable. The percentages of districts and schools that reported implementing each of the 10 prevention strategies were examined, as well as the mean implementation scores for districts and schools. Percentages of districts and schools receiving PD and TA on any topic and on each of the 12 specific topics were also examined.

Independent *t* tests were conducted to examine whether districts and schools that received PD or TA on any topic or PD or TA on specific topics demonstrated different COVID-19 prevention implementation scores than districts and schools that did not receive PD or TA on any topic or on specific topics; *P* values <.05 were considered statistically significant.

RESULTS

Implementation of COVID-19 prevention strategies

Individual prevention strategies were implemented by 35% to 95% of districts and 38% to 96% of schools (Table 1). On average, districts reported implementing 7.11 of the 10 prevention strategies and schools reported implementing 7.30 of the prevention strategies (Table 2). For both districts and schools, the use of standard protocols for cleaning and disinfecting frequently touched surfaces was the most frequently implemented prevention strategy (95% of districts and 96% of schools). Teaching and reinforcing hand hygiene and hand washing were also implemented frequently by districts (95%) and schools (92%). Operating an enhanced ventilation system was the least frequently implemented strategy by 35% of districts and 38% of schools.

Professional development and technical assistance received

About two thirds of districts (66%) and schools (69%) reported receiving PD on at least 1 of 12 COVID-19-related topics during the 2020–2021 school year, whereas about one third of

districts (33%) and schools (29%) reported receiving TA on at least 1 topic during the same period (Table 3).

PD on 12 individual topics was received by 32% to 54% of districts and 36% to 57% of schools during the 2020–2021 school year. TA on each of the 12 individual topics was received by 11% to 22% of districts and 10% to 17% of schools.

COVID-19 prevention implementation scores by receiving any professional development and technical assistance

An independent samples *t* test revealed that schools that reported receiving PD on at least 1 topic had higher COVID-19 implementation scores on average than schools that did not receive any PD ($t = 7.40$; $P < .001$) (Table 4). Similarly, districts that reported receiving PD on at least 1 topic also had higher COVID-19 implementation scores than districts that did not receive any PD; however, for districts, the finding was not statistically significant ($t = 1.92$; $P = .06$).

In the case of TA received (Supplemental Digital Content 1, Table, available at <http://links.lww.com/JPHMP/B356>), schools receiving TA on at least 1 topic had higher COVID-19 implementation scores than schools that did not receive any TA ($t = 2.21$, $p = .03$). A similar relationship was not found for districts.

COVID-19 prevention implementation scores by receiving professional development on individual topics

Regarding PD on individual topics, schools that reported receiving PD on 5 distinct individual topics had higher COVID-19 implementation scores than schools that did not receive PD on those same topics: offering physical education and physical activity in school while social distancing ($t = 2.82$; $P = .01$); continuing physical education and physical activity during school closures ($t = 2.45$; $P = .02$); addressing the needs of students with chronic health conditions and special health care needs during COVID-19 ($t = 3.45$; $P < .001$); managing students with chronic conditions while social distancing ($t = 2.39$; $P = .02$); and supporting vulnerable individuals at higher risk for COVID-19 ($t = 2.11$; $P = .04$). No significant differences in COVID-19 implementation scores were found between districts that received PD and did not receive PD on individual topics (Table 4).

COVID-19 prevention implementation scores by receiving technical assistance on individual topics

Significant differences in COVID-19 implementation scores were found between schools that did and did not receive TA for all 12 of the individual TA topics (Supplemental Digital Content 1, Table, available at <http://links.lww.com/JPHMP/B356>). Among districts, differences in COVID-19 implementation scores were observed among districts for each of 10 topics (Supplemental Digital Content 1, Table, available at <http://links.lww.com/JPHMP/B356>). The only 2 TA topics received by districts that were not related to higher implementation scores among districts were CDC's school-based COVID-19 guidance ($t = 1.39$; $P = .17$) and maintaining appropriate social distance during meals ($t = 1.71$; $p = .09$).

Discussion

Districts and schools reported moderate levels of implementation of CDC's COVID-19 prevention strategies, with the majority of districts and schools implementing more than half of the prevention strategies recommended by the CDC during the 2020–2021 school year. Districts and schools reported similar rates of implementation across most strategies as many COVID-19 policies and practices are determined at the district level and passed down to schools for implementation. Cleaning and disinfection, hand washing, respiratory etiquette, and contact tracing were the most frequently implemented prevention strategies. Ventilation system improvement, which can be costly, was the least frequently implemented strategy.

About twice as many districts and schools received PD than TA to support implementation of COVID-19 prevention strategies. This is likely because individualized TA is more labor-intensive to provide than PD. Furthermore, virtual learning technologies that flourished during the pandemic to resume educational services during school closures may have expanded PD delivery and uptake among district and school staff, especially those in rural and remote communities.

PD and TA received by schools were associated with the implementation of more COVID-19 prevention strategies in school settings. Although not conclusive, findings suggest that PD and TA may have contributed to the implementation of COVID-19 prevention strategies. Alternatively, it is possible that schools or districts with greater initial capacity for implementation were more likely to participate in training and TA offerings.

TA received on individual topics was generally associated with implementation of more COVID-19 prevention strategies among districts and schools, whereas for PD, only 5 individual topics revealed a relationship with greater implementation in schools. This might suggest that one-on-one TA is more effective than PD when addressing individual topics. Alternatively, schools and districts that received TA on individual topics may share other factors that are associated with stronger implementation.

Limitations

Evaluation data did not control for a priori differences among districts and schools before PD and TA were received; therefore, we are not able to conclude that the observed differences in implementation of COVID-19 prevention strategies among districts and schools were a direct result of PD and TA received. Furthermore, the sample is limited to states funded by CDC to support school health infrastructure and thus are not representative of states that do not receive such funding. The use of varied sampling strategies across states could result in differences in how districts and schools are represented across states. The overall response rate was low, particularly among schools. States, districts, and schools also varied in their participation due to the overwhelming demands of the pandemic. In addition to the limitations of the sample, the PD and TA topics measured by the survey were not designed to align one-to-one with the recommended COVID-19 prevention strategies. Implementation measures of COVID-19 prevention strategies did not account for changes in CDC's operational guidance after October 2020. Self-reported measures of implementation and PD and TA received did not assess fidelity, quality of implementation, intensity, or the

modality of the PD and TA received. The evaluation did not examine implementation of COVID-19 prevention strategies in relation to school or community-level case counts during the program period.

Conclusion

Evaluation findings lend preliminary support for the use of PD and TA as tools to promote the implementation of CDC guidance to prevent the spread of COVID-19 in schools. The results contribute to a body of evidence to support PD and TA as promising tools for managing the spread of infectious diseases and advancing public health aims in school settings. However, more questions remain regarding the impacts of PD and TA in effectively supporting strategies to prevent and manage acute infectious diseases like COVID-19. Empirical studies are needed to verify these findings and to better understand how the quality and duration of PD and TA and other factors may affect implementation and impacts of a broader range of prevention and health promotion strategies in schools.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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The evaluation protocol was reviewed and determined to be not human subjects research by the ICF Institutional Review Board (IRB FWA00002349).

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Implications for Policy & Practice

- The COVID-19 pandemic revealed a critical need for districts and schools to be prepared to manage acute infectious diseases to prevent the harmful consequences of interruptions in regular school operations.
- An evaluation found that schools that received professional development (PD) and/or technical assistance (TA) on at least 1 COVID-19-related topic reported implementing more COVID-19 prevention strategies than schools that did not receive any PD and/or TA.
- Findings suggest that PD and TA may be important tools for increasing schools' capacity to prevent and manage acute infectious diseases and respond to future public health emergencies.
- Empirical studies are needed to determine the necessary and/or effective parameters of PD and TA in preparing districts and schools to manage ongoing respiratory infections (post-pandemic), respond to acute outbreaks and future pandemics, and advance broader public health aims in school settings.

TABLE 1
Number and Percentage of Districts and Schools Implementing Individual COVID-19 Prevention Strategies

COVID-19 Prevention Strategies	Districts N = 310		Schools N = 931	
	n	% Fully Implementing	n	% Fully Implementing
Use standard protocols for cleaning and disinfecting frequently touched surfaces	257	95	826	96
Teach and reinforce hand hygiene and hand washing	259	95	826	92
Teach and reinforce respiratory etiquette	259	92	826	86
Conduct systematic contact tracing of infected students, teachers, and staff	256	91	822	93
Require masks for teachers and staff	262	81	842	88
Require masks for students	258	74	839	82
Promote the maintenance of at least 6 feet distance between people	258	60	832	60
Use cohorts or pods to minimize interactions and exposure	252	59	814	62
Increase circulation of outdoor air as much as possible (eg. open windows)	249	55	804	55
Operate an enhanced ventilation system	247	35	790	38
Average percent (across implementation strategies)		74		75

Abbreviations: N, total number of survey responses; n, number of valid responses per implementation strategy.

TABLE 2
Mean Number of COVID-19 Prevention Strategies Fully Implemented by Districts and Schools

	Districts N = 265		Schools N = 850	
	Mean	SD	Mean	SD
Average number of COVID-19 prevention strategies fully implemented	7.11	2.14	7.30	2.05

Abbreviation: N, number of sites with a valid implementation score.

TABLE 3

Number and Percentage of Districts and Schools Receiving Professional Development and/or Technical Assistance on Any

	Districts N = 310				Schools N = 931			
	PD		TA		PD		TA	
	n	%	n	%	n	%	n	%
Received PD/TA on at Least 1 Topic	205	66	102	33	642	69	270	29
Received PD/TA on Individual Topics								
CDC's school-based COVID-19 school-based guidance	157	51	48	15	507	54	130	14
Maintaining appropriate social distance during meals	143	46	42	14	465	50	120	13
Continuing meal and snack programs during school closures	118	38	67	22	411	44	158	17
Offering physical education and physical activity in school while social distancing	117	38	39	13	375	40	115	12
Continuing physical education and physical activity during school closures	100	32	40	13	336	36	132	14
Addressing the needs of students with chronic health conditions and special health care needs during COVID-19	127	41	51	16	432	46	118	13
Safely assessing students and staff for COVID-19	154	50	44	14	516	55	112	12
Procedures for isolating sick individuals safely	167	54	40	13	533	57	110	12
Addressing the social, emotional, and mental health needs of school staff during and after school closures	150	48	34	11	488	52	95	10
Supporting students' social, emotional, and mental health needs during and after school closures	144	46	37	12	475	51	102	11
Managing students with chronic conditions while social distancing	122	39	49	16	400	43	122	13
Supporting vulnerable individuals at higher risk for COVID-19	110	35	52	17	373	40	129	14

Abbreviations: CDC, Centers for Disease Control and Prevention; N, total number of survey responses; n, number of sites that received PD/TA per topic; PD, professional development; TA, technical assistance.

COVID-19 Prevention Implementation Scores by Professional Development Received by Districts and Schools

TABLE 4

	PD Received	Districts N = 265				Schools N = 850			
		Mean ^a	SD	t	p ^b	Mean ^a	SD	t	p ^b
Received PD on at Least 1 Topic									
PD on at least 1 topic	Yes	7.28	2.03	1.92	.06	7.61	1.89	7.40	<.001
	No	6.62	2.42			6.34	2.23		
Received PD on Individual Topics									
CDC's school-based COVID-19 guidance	Yes	7.04	1.88	-0.34	.73	7.52	1.76	2.21	.13
	No	7.15	2.20			7.26	2.09		
Maintaining appropriate social distance during meals	Yes	7.31	1.58	0.75	.45	7.53	1.68	1.52	.12
	No	7.09	2.23			7.26	2.10		
Continuing meal and snack programs during school closures	Yes	7.49	1.65	1.88	.06	7.30	1.76	0.03	.98
	No	7.01	2.27			7.30	2.11		
Offering physical education and physical activity in school while social distancing	Yes	7.23	1.78	0.37	.71	7.75	1.79	2.82	.01
	No	7.11	2.20			7.23	2.08		
Continuing physical education and physical activity during school closures	Yes	7.43	1.81	1.09	.28	7.67	1.83	2.45	.02
	No	7.08	2.19			7.23	2.08		
Addressing the needs of students with chronic health conditions and special health care needs during COVID-19	Yes	7.41	1.70	1.24	.22	7.82	1.71	3.45	<.001
	No	7.06	2.23			7.22	2.09		
Safely assessing students and staff for COVID-19	Yes	6.86	1.88	-1.00	.32	7.47	1.84	1.05	.30
	No	7.18	2.19			7.27	2.08		
Procedures for isolating sick individuals safely	Yes	7.25	1.48	0.52	.61	7.40	1.91	0.58	.56
	No	7.11	2.24			7.29	2.07		
Addressing the social, emotional, and mental health needs of school staff during and after school closures	Yes	7.41	1.74	0.98	.33	7.40	1.74	0.58	.56
	No	7.09	2.19			7.29	2.08		
Supporting students' social, emotional, and mental health needs during and after school closures	Yes	7.19	1.82	0.21	.83	7.31	1.76	0.08	.93
	No	7.12	2.19			7.30	2.09		
Managing students with chronic conditions while social distancing	Yes	7.45	1.87	1.29	.20	7.66	1.77	2.39	.02
	No	7.06	2.19			7.24	2.09		
Supporting vulnerable individuals at higher risk for COVID-19	Yes	7.23	1.71	0.45	.65	7.60	1.72	2.11	.04

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Districts N = 265					Schools N = 850				
PD Received					Mean ^a	SD	t	p	b
No					7.10	2.23		7.25	2.10

Abbreviations: CDC, Centers for Disease Control and Prevention; N, number of sites with valid implementation score; PD, professional development.

^aMean COVID-19 prevention implementation score (number of implemented strategies out of 10).

^bComparison of districts/schools that received PD and districts that did not receive PD (bold text signifies that the values are statistically significant at P = .05 or lower). Equal variances were not assumed.