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Transforming Evidence Into Action: A Commentary on School-Based Physical Activity and Nutrition Intervention Research

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CONFLICT OF INTEREST

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The Whole School, Whole Community, Whole Child (WSCC) framework advances an intentional and integrated vision of policies, practices, and programs that support students' health and academic success across 10 components within school settings. WSCC promotes family and community engagement with schools and recognizes schools as key locations for equitable access to services for addressing health disparities and increasing healthy options for all students.[1–3] This approach has some formal recognition in the United States; 18 states and the District of Columbia have statutes or regulations addressing WSCC or a coordinated school health approach, and another 17 include these concepts in noncodified policy language, such as nonbinding guidance, agreements, or procedures from state agencies.[4]

This special issue presents a decade of school-based physical activity (PA) and nutrition intervention research conducted across multiple WSCC components. Individually and collectively, these articles identified evidence-based strategies that can be implemented within schools and highlighted opportunities for future research focused on school-based PA and nutrition interventions. Here, we use the terms interventions and strategies interchangeably to describe changes to school policies, practices, or infrastructure.

EVIDENCE-BASED STRATEGIES

Across the systematic reviews in this special issue, we identified evidence-based strategies that affected student and employee PA and nutrition knowledge, attitudes, and perceptions (KAP) and behaviors and were assessed for effectiveness among diverse student populations (eg, by age, gender, race/ethnicity, geography). Many of the evidence-based strategies identified in this special issue embedded key public health implementation practices in their approach, such as conducting self-assessments to identify school health strengths and weaknesses and guide action planning; establishing supportive infrastructure through school health councils, teams, coordinators, and leadership involvement; engaging those responsible for implementing programs (eg, teachers, staff) and those who experience interventions (eg, students, families) in school health assessments, infrastructure (eg, councils, teams), and program design; coordinating strategies across WSCC components; and using plans and policies to formalize and, ideally, sustain activities.[5–10]

Our findings support several existing recommendations and conclusions.[9,11–15] We found several school-based strategies that were identified as effective for increasing the availability of nutritious foods, improving student and employee PA and nutrition KAP and/or behaviors, and some secondary outcomes (eg, fitness, body mass index, mental health):

- Coordinated, multicomponent approaches to support school PA and nutrition programs[16]
- School-level PA policies, physical education (PE), and recess[17]
- Nutrition standards for school meals and competitive foods[18]

- Professional development for school nutrition professionals on procuring, preparing, and presenting nutritious foods[18]
- School-level practices to improve the palatability of school meals and offer taste tests, pre-slice fruit, and provide recess before lunch[18]
- Changes to the physical environment (eg, adding playground equipment and visual prompts to promote PA and healthy options in the cafeteria)[19]
- Hands-on, skills-based, and interactive health education for all grade levels[20]
- Multicomponent employee health and well-being programs[21]
- Out-of-school time (OST) programs using PA and nutrition standards and supportive programming practices paired with professional development and technical assistance.[22]

We found evidence supporting existing recommendations for comprehensive school PA programs that include school-level PA policies, PE and recess during the school day, and focused PA interventions offered multiple times a week before or after school to increase student PA and, in some cases, reduce sedentary behavior.[9,14,17,22]

Recommendations from national groups specific to comprehensive school PA program components may provide additional rationale to support adoption and implementation. For example, the Community Preventive Services Taskforce (CPSTF) recommends both classroom PA breaks and integrating PA into lesson plans as strategies to increase PA and promote attentiveness in class without requiring costly equipment.[23,24] CPSTF also recommends programs that facilitate active transportation to and from school to increase PA while connecting families, communities, and schools.[25] In its recommendation for PE, CPSTF emphasizes curricular and teaching strategies to increase the time spent in moderate to vigorous PA.[11]

We also identified changes to school physical environment that may promote PA, such as enhancing green spaces, nature, and playgrounds, which included low-cost strategies such as painted play areas.[19] We found that changes to the school environment such as enhanced green spaces resulted in social-emotional benefits such as prosocial play interactions.[19] Furthermore, changes to school curricula and programming to include yoga and mindfulness activities resulted in mental health benefits for both students and staff.[19]

Health education delivered across all grade levels that includes hands-on and skill-building learning experiences and dedicated content on PA and nutrition can improve students' KAP and behaviors.[20] Additionally, the CPSTF recommends school gardening with a nutrition education component to increase students' vegetable consumption.[26] School gardens may also improve school employees' fruit and vegetable consumption; however, we only found 1 study evaluating this approach.[27] Other opportunities for skill-based nutrition education in OST, such as afterschool cooking clubs and nutrition curricula, showed some evidence of effectiveness but need additional evaluation.[22]

The implementation of the Healthy, Hunger-Free Kids Act of 2010 (Public Law 111–296) led to nationwide adoption of nutrition standards for school meals and foods sold and

marketed throughout the school day.[28] These standards improved the quality of meals served in schools and necessitated a shift toward identifying strategies to increase the selection and consumption of these foods.[29] The CPSTF recommends Healthy School Meals for All (ie, universal school meals), which increases participation in school meal programs, allowing all students equitable access to free meals.[30] However, to realize the potential impact, the foods that are served must be eaten. Demand-side interventions, such as nutrition education and modifications to the cafeteria environment and layout, can influence students' KAP and receptivity to choosing and eating healthier options. Only 1 study evaluated the impact of nutrition standards for foods marketed in schools and technical assistance to support their adoption, highlighting the need for more evaluations of this marketing strategy.[31] Supply-side interventions influence how food is served, such as providing ongoing professional development for school nutrition staff, improving the palatability of school meals, offering taste tests, pre-slicing fruit, providing recess before lunch, and offering incentives or rewards for trying healthier options, can increase students' selection and consumption of healthier items.[18]

Across the articles, we observed some common approaches. Many interventions that reported positive results for at least 1 PA or nutrition outcome provided implementation-focused professional development or technical assistance and/or engaged family or community members frequently as part of a coordinated approach.[16–18,22,32] Family and community engagement strategies to support and promote PA and nutrition in school and OST settings included communicating with families and community members; providing classes and support for families; offering volunteer opportunities for family and community members; involving families and community members in decision making; reinforcing health knowledge and practices in the home and community; and promoting collaborations among school and community to support students and their families.[32]

Few studies evaluated school-based employee health and well-being programs.[21] This left us to extrapolate from the broader employee health and well-being literature, which finds that multicomponent health and well-being programs that include educational, behavioral, and environmental PA and nutrition strategies can improve employees' KAP, PA and dietary behaviors, anthropometric outcomes, and some indicators of mental health.[21] Structural interventions, such as improving sick leave policies and providing affordable health insurance options, have been less widely evaluated in schools but may be important to consider when evaluating staff health and well-being and retention.[33]

IMPLEMENTATION TO ADVANCE EQUITY

Implementation of evidence-based strategies that support student and employee PA and healthy eating will require leadership, coordination, commitment, and resources.[10,34,35] As previous studies have concluded, establishing school health infrastructure at multiple levels (eg, state, school district, school), assessing existing policies and practices, and creating school health portfolios can lead to sustained implementation of policies, practices, and programs.[10,36–38]

Implementation of these strategies is important and relevant, especially in a post-pandemic time. Given the significant and disparate impact that the COVID-19 pandemic had on schools and students, leaders need to be equipped with the knowledge, skills, and abilities to support not only the academic success of students, but also the health of all students and employees. For some students during the pandemic, remote learning models exposed inequities and disparities related to access to nutrition, PA, social services and health services, and socioemotional support that was normally provided through in-person learning and school sites.[39–42] Increased awareness of these gaps yielded more attention to inequitable access to programs and services during the pandemic, and highlighted opportunities for improving wraparound services and interventions that address the academic, social, and physical needs of students.[43,44] To that end, the evidence-based strategies reported in this special issue are therefore timely and urgent. They involve a range of supports for students, schools, and communities to improve student health and learning. Interventions that can influence multiple outcomes may be especially appealing to school administrators. School leaders can consider how acceptable, feasible, and practical these strategies would be within their school environments.

Our methods aimed to identify evidence-based strategies that can have an impact on students and staff. More evidence is needed to learn how these strategies can reach all students, particularly those in communities with fewer resources, affected by systemic inequities, and with less access to PA and nutrition programs and services. To identify actions to improve reach, acceptability, feasibility, and accessibility of evidence-based strategies that can be implemented within school settings, we can look to the included interventions and process evaluations of their implementation. We can also draw from implementation frameworks (eg, the Quality Implementation Framework, Consolidated Framework for Implementation Research) to identify actions that can be implemented within school settings while addressing known barriers, such as lack of institutional support, competing priorities, and limited financial resources.[7,45]

Potential actions include:

- Building a diverse team for action planning and prioritizing PA and nutrition programs, policies, and practices. Whether reviewing school or OST policies and practices, teams may benefit from focused technical assistance,[46] facilitation,[47] or learning collaboratives to conduct self-assessments and action planning.[48] Involving students through teen/peer mentoring models and participation in school wellness councils showed promise but was neither evaluated widely nor in high quality studies,[16,20,22] suggesting more research may be needed.
- Engaging those who are responsible for delivering an intervention (eg, PE teachers, nutrition services professionals) and those who receive an intervention (students, their families) in developing and/or adapting programs, interventions, and services to meet their needs and reflect their preferences.[6,7]
- Ensuring evidence-based programs are accessible to all students and learning more about facilitators and barriers to implementation of the evidence-based strategies among diverse populations. This includes students from urban, rural,

and suburban communities; communities of color; students with disabilities; and LGBTQ+ students.

- Employing low or no cost strategies, such as taste testing; pre-slicing fruit for meal programs; promoting free and reduced-price meal programs; holding recess before lunch; adding more minutes for recess and free play as well as classroom-based PA; and adopting existing health and PE curricula and programs to meet diverse cultural needs of students.[17,18,20]
- Identifying community assets and cultivating partnerships to increase capacity for school health and to support program and/or policy adoption. Potential partnerships could be with community organizations, retailers, universities, health care systems, and local non-profits.
- Providing professional development and technical assistance on the instructional or programmatic materials and skills that participants use.[49] Examples include training school nutrition staff on using new equipment, preparing new recipes, meeting nutrition standards, improving palatability of menu items, and enhancing presentation of meals (eg, behavioral design); training health education teachers to implement interactive, hands-on learning activities; training PE and classroom teachers to provide more active time during recess and class time; and training for OST staff on skills needed for implementing PA or nutrition standards.
- Communicating and demonstrating how interventions align with the priorities of school decision-makers and those responsible for delivering and receiving interventions.

FUTURE RESEARCH

Many studies evaluated multicomponent interventions, providing evidence of feasibility and effectiveness, primarily within the context of a research study. Practitioners may be left wondering where to start, how to apply an incremental approach, or guide adaptations. Additional research that examines the length, frequency, and intensity of interventions can guide schools in layering or combining strategies to improve students' and staff nutrition and PA KAP and behaviors. Research that distills core intervention components and processes into "usable innovations" can help schools adopt and adapt interventions.[6,8] Learning more about the scalability and replication of "usable innovations" (eg, with larger numbers of school-aged populations, or in schools with fewer financial or staffing resources) is critical for program implementation and for health equity. Lastly, research into "spillover benefits" of PA and nutrition may help secure administrator support. A robust evidence base highlights how PA and nutrition support learning[50]; however, additional research about the impact of these behaviors on students' emotional well-being and school connectedness may help gain buy-in.

While numerous studies across articles in this special issue focused on reaching specific populations facing inequities, including those who are experiencing poverty, live in rural areas, or have disabilities, more research is still needed to understand the feasibility

and acceptability of interventions among study participants. Previous surveys have found unmet demand for afterschool programming to be highest among rural, black, and Hispanic/Latino children.[51,52] These are, demographically, the same communities that were disproportionately affected by the COVID-19 pandemic, and they may benefit from participation in OST programs within a community-based strategy to address inequities in health and education exacerbated by the pandemic.[44] Future studies can consider how and whether OST interventions help move us closer to achieving health equity.

The articles demonstrate that empowering participants through health education is one way to help achieve health equity.[20] More exploration of health education intervention strategies is needed and may include approaches such as being responsive to participants' interests and experiences; building culturally-competent curricula or programs into existing structures (eg, classes, OST programs); and engaging peers or mentors to lead or deliver health education.

Assessing the effectiveness of employee health and well-being programs in school settings is critically important, particularly given the latest trends of teacher and staff burnout and desire to leave the profession.[53] Only 4 school-based studies were identified for inclusion in the employee health and well-being review in this special issue.[21] While many evidence-based strategies from other workplace settings can be applied to the school setting, more research with teachers and school staff can provide greater context and understanding for the barriers and facilitators to implementation in schools.

Conclusion

Taking a decade of evidence into account, as presented in this special issue, many strategies emerged that were effective at improving student and staff PA and nutrition KAP and behaviors, including strategies that have been examined extensively and newer, emerging strategies. Evidence-based strategies can support changes in student and staff KAP and behaviors. To meaningfully shift health behaviors, students would benefit from supports across the school, community, and home environments as presented in the WSCC framework while structural barriers to health equity are simultenaously being addressed. We find that the evidence for the impact of interventions that align with the WSCC framework is strong and should therefore drive a call to action. Strong school leadership is necessary, as are relevant local, state, and national policies, and wise use of available resources. Following the COVID-19 emergency and related disruptions, we have an historic opportunity to expand research into and ensure accessibility of evidence-based PA and nutrition strategies. Adapting approaches to achieve inclusion and equitable health attainment for all students and staff is possible.

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