HHS Public Access

Author manuscript

J Sch Health. Author manuscript; available in PMC 2024 August 26.

Published in final edited form as:

J Sch Health. 2023 September ; 93(9): 842–852. doi:10.1111/josh.13377.

Supporting School Staff: Insights From Employee Health and Well-Being Programs

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Abstract

BACKGROUND: The workplace is an important setting for health protection, health promotion, and disease prevention programs. In the school setting, employee health and well-being programs can address many physical and emotional concerns of school staff. This systematic review summarizes evidence-based approaches from employee health and well-being interventions supporting nutrition and physical activity (PA) in a variety of workplace settings.

METHODS: The 2-phase systematic review included a search for articles within systematic reviews that met our criteria (addressing employee health and well-being programs; published 2010–2018; Phase 1) and the identification of individual articles from additional searches (addressing school-based employee interventions; published 2010–2020; Phase 2). We included 35 articles.

FINDINGS: Across all studies and types of interventions and workplace settings, findings were mixed; however, multicomponent interventions appeared to improve health behaviors and health outcomes among employees.

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Human Subjects Approval Statement

Preparation of this paper did not involve primary research or data collection involving human subjects, and therefore, no institutional review board examination or approval was required.

Conflict of Interest

No authors of this paper have any conflict of interest.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

SUPPORTING INFORMATION

The following Supporting Information is available for this article:

Table S1: Employee Health Study Details.

Additional supporting information may be found online in the Supporting Information section at the end of the article.

IMPLICATIONS FOR SCHOOL HEALTH POLICY, PRACTICE, AND EQUITY: Schools can apply this evidence from employee health and well-being programs in various workplace settings to implement coordinated and comprehensive employee health and well-being programs.

CONCLUSIONS: Employee health and well-being programs may be effective at supporting nutrition and PA. Schools can use findings from employee health and well-being programs in workplaces other than schools to support school staff.

Keywords

school employee well-being program; school staff; physical activity; nutrition

Education is vital to the long-term success and health of the nation, but the teaching profession is currently in crisis. Teaching is one of the most stressful occupations in the United States. High stress levels are affecting teacher health and well-being, causing teacher burnout, lack of engagement, job dissatisfaction, poor performance, and high turnover rates.[1,2] Stressors include inadequate pay; perceived lack of respect; working conditions/environment that are less safe than in other professions; job demands; and lack of autonomy and available resources. The COVID-19 pandemic has only exacerbated these stressors in recent years.[3]

These job stressors are contributing to a teacher shortage. The US Bureau of Labor Statistics estimated that more than 270,000 teachers would leave their profession every year between 2016 and 2026.[4] They also found that between December 2021 and December 2022 the number of people leaving the education services profession rose from 84,000 to 92,000.[5] Multiple states have even lowered the hiring standards for teachers in an attempt to get adults in the classroom to avoid a potentially devastating long-term impact on children that can result when there is a lack of instruction and supervision.[6]

One strategy to improve this precarious situation is to address the health and well-being of teachers and other school staff to retain qualified school staff. The workplace provides many opportunities for promoting health and emotional well-being and preventing disease and injury. Workplace health programs can influence social norms and create health promoting cultures; establish health-promoting policies; increase healthy behaviors such as dietary and physical activity (PA) changes; improve employees' health knowledge and skills; help employees get necessary health screenings, immunizations, and follow-up care; and reduce employees' on-the-job exposure to substances and hazards that can cause diseases and injury.[7]

Scaling these programs across schools and school districts can have a large reach, as schools are a major employer. The latest estimates indicate that there are approximately 3.2 million teachers[8] in public schools and 0.5 million in private schools in the nation.[9] The school community is more than teachers and students. In fact, half of those employed in schools are not classroom teachers, and include librarians, teacher aides, special education instructional aides, and a variety of other instructional aides who work directly with students; administrative staff like principals, secretaries and other clerical support staff; health services staff such as guidance counselors, nurses, social workers, psychologists,

and speech therapists; and other services staff like food service personnel, custodial, and maintenance and security personnel.[10]

Studies of workplace health and well-being interventions show that employees' physical, mental, and emotional health can be improved,[11–13] and these programs can potentially be adapted and implemented within school settings. When schools offer these programs, it shows faculty and staff that they are valued and are important to the organization. These programs can create a positive work climate and environment by improving working conditions, addressing concerns such as safety, and promoting supportive and collegial relationships. PA and nutrition interventions can be available to all and influence many health risks and conditions, including mental health concerns of teachers and staff, that increase costs and reduce productivity. Lastly, school staff are important role models for students; they can model healthy lifestyle practices, which may influence students to adopt these practices.

Some research has demonstrated the effectiveness of workplace health and well-being programs in schools. An economic analysis of a school district workplace wellness program, initiated in 2011–2012, incorporated administrative planning, behavior change campaigns, and insurance incentives (eg, lower co-pay and deductibles).[14] The program results showed reductions in a number of health risk factors (eg, body mass index [BMI], blood pressure), and reported a return on investment of $3.60 for every dollar spent on the program.[14]

We wanted to know if other effective school employee health and well-being programs have been identified and which strategies are important to their success. We also wanted to know what other workplace settings offering health promotion are available that might address school teacher and staff concerns and approximate the drivers, barriers, and facilitators found in the school setting. This systematic review summarizes evidence-based approaches from school and other workplace health and well-being interventions supporting nutrition and PA among employees. We examined research published since 2010. A better understanding of the employee health and well-being literature can enable public health and school health practitioners to proactively work with schools to implement evidence-based strategies.

METHODS

We conducted a 2-phase systematic review as described in the introduction and methods paper that opens this special issue.[15] We started by searching existing anchor review articles on employee wellness and anchor articles for other prioritized topics and identifying individual qualifying articles on employee wellness that were published during 2010–2018 (Phase 1). For Phase 1, research librarians developed search strategies for the review of reviews. We found recent and relevant reviews and therefore did not conduct additional library searches for individual articles about employee wellness. During Phase 2 we identified additional articles that included school employee wellness interventions from searches from the larger systematic review related to school-based interventions to address student PA and nutrition and health education, Table 1 presents the Medline search queries used, and Figure 1 shows the article selection process.

To be eligible for consideration, review articles and individual articles had to address the worksite setting, including schools; describe employee well-being interventions (policy, program, systems change, environmental change); align with a key research question related to improving PA and dietary outcomes in employees; and meet all other criteria described in Table 1 of the introduction and methods paper in this special issue.[15] For each included article, reviewer pairs met to reconcile any differences in extraction and in risk of bias assessment reached 100% agreement. In Phase 1, we identified 4 sufficiently relevant and recent systematic reviews on employee well-being[16–19] and, within those reviews, identified 34 unique articles for data extraction (Figure 1). Additionally, we identified 3 individual articles from other anchor review articles prioritized for other topics from the larger systematic review. Additional details about systematic review methods, documentation, data extraction, and risk of bias assessment can be found in the introduction and methods article at the start of this special issue.[15]

From these 37 articles, we excluded 3 for being out of scope (ie, irrelevant outcomes) and moved 2 articles to another article within this special issue because they did not evaluate the school employee wellness component, resulting in 32 articles from Phase 1. When extracting data during Phase 2, subject matter experts identified an additional 3 articles related to school employee health and well-being from searches related to student PA and nutrition interventions.[20–22] Overall, this process resulted in the extraction of 35 unique articles that contributed evidence about employee well-being.

FINDINGS

The 35 articles included in this systematic review represent 36 employee health and well-being interventions from 35 unique studies, 4 of which were implemented in school settings. Table 2 presents study design, demographic characteristics (eg, race/ethnicity, employer size) and the significance of intervention outcomes (ie, expected direction, null results, or the unexpected direction) in aggregate by intervention type. Table S1, Supporting Information, includes detailed information about each included study, including intervention components and characteristics, type of workplace, population demographics, and risk of bias assessments. Across the 35 studies included in this review, 15 were randomized controlled/clinical trials; 20 were quasi-experimental, including 13 cohort studies. Worksite interventions, implemented in a variety of workplace settings, used varied approaches to improve the nutrition and PA behaviors and overall health of employees.

Behavioral Interventions

Three studies (3 interventions) in this category used behavioral cue interventions, which focused on increasing PA and reducing sedentary time, using strategies such as alerts and prompts to disrupt sedentary behavior and foster activity breaks.[23–25] Two were implemented in corporate/business workplaces,[23,24] and 1 was implemented in a university.[25] Two of the 3 studies were able to reduce sedentary time.[24,25] In addition, 1 study saw a slight reduction in several biomarkers (ie, total cholesterol, triglycerides, and fasting blood glucose) as a result of breaking up prolonged sitting during the workday.[24]

Educational Interventions

We identified 16 educational interventions in 15 studies. Most were curriculum based, of which 7 employed the nationally recognized Diabetes Prevention Program (DPP), a lifestyle change program recognized by CDC to prevent or delay type 2 diabetes.[26–32] The remaining educational interventions targeted cardiovascular disease,[33–35] or obesity and weight management[36,37] or targeted diabetes without using the DPP.[38–40] The interventions were implemented in a variety of workplace settings, including corporate/business,[29,30,33,35,36,38,40] manufacturing,[27] health care,[32,34] locomotive maintenance,[26] long-term care,[39] university,[28,37] and county government.[31,32] No school-based interventions were identified. Intervention strategies included educational sessions, group classes, 1-on-1 consultations, self-study, goal setting, coaching, financial incentives, and technology integration for tracking progress and obtaining feedback. Three interventions assessed and found improvements in knowledge, attitudes, and perceptions as a result of the intervention.[26,38,39] Of the 2 educational interventions that examined self-efficacy, results were mixed; healthy eating self-efficacy improved in 1[29] and remained unchanged in the other.[26] Of the 4 interventions that assessed dietary outcomes, 2 reported improvements in some dietary intake (eg, fiber, fats)[28,29]; 1 found no change in fruit and vegetable consumption,[37] and another found a decrease in fruit and vegetable consumption as well as a decrease in certain positive eating behaviors (eg, frequency of family dinner, eating breakfast).[31] Of the 8 interventions with PA outcomes, results were also mixed. Five interventions increased PA and fitness,[29–32] while 3 found no changes.[28,37,39] Of the 12 interventions that assessed biomarkers, most (n = 7) found no change,[30–32,34,35,38,39] while 2 reported reductions in glucose and blood pressure,[28,29] and 3 found increases in systolic blood pressure, high-density lipoprotein cholesterol, or blood sugar levels.[32,36,40] Fifteen interventions assessed anthropometric outcomes; most (n = 8) found significant decreases in BMI, body weight, or waist circumference as a result of the intervention.[26–30,34,35,39] Four interventions reported no change in anthropometric outcomes,[32,36–38] while 3 had negative outcomes (eg, increases in BMI or waist circumference).[31,32,40] Three studies (3 interventions) reported on mental health outcomes; 1 study found positive changes,[33] and 2 found no change in depressive symptoms, stress, or weight stigma as a result of the intervention.[31,38]

Environmental Interventions

Nine studies (9 interventions) used environmental interventions that included standing desks, ergonomic workstations, treadmill desks, point-of decision prompts, enhanced PA facilities, walking paths, vending machine changes, building design to foster healthy eating, and increased availability of lower priced and healthier options in vending machines.[20,41–48] The interventions were implemented primarily in corporate/business workplaces,[42–46,48] a manufacturing facility,[47] a metropolitan transit facility[41]; 1 was implemented in a school setting.[20] The 1 intervention that was implemented in a school setting focused on changes to the built/physical environment by incorporating architectural features to support healthy eating.[20] Three interventions reported on dietary intake; 2 found no change in fruit and vegetable consumption,[47,49] and 1 saw an increase.[41] One of the interventions, which was implemented in a school setting, also saw a reduction of fat intake.[49] Three of the 5 interventions reporting on PA outcomes found that environmental interventions increased the

number of minutes participants were engaged in PA or reduced sedentary time,[42,43,46] and 2 found no effect on PA outcomes.[41,44] Overall, the environmental interventions were found to have no effect on biomarkers and anthropometric outcomes.[41,43,45–48] One study examined mental health outcomes and found that the intervention improved well-being and energy and decreased fatigue.[42] Results for secondary outcomes related to productivity examined in 2 studies (2 interventions) were mixed, with 1 finding increased concentration at work and reduced days missed because of health problems[43] and the other finding no change.[42]

Multicomponent Interventions

Eight multicomponent interventions were identified; some used a sociological framework and included a combination of educational, behavioral, and environmental changes.[21,22,50–55] Interventions were implemented in manufacturing,[50,54] transportation,[50] hotel/hospitality,[51] corporate/business,[53] health care,[52] and school settings.[21,22,55] The 3 studies implemented in schools used a variety of intervention strategies, including teacher and staff PA opportunities, role modeling, behavior change campaigns, training and education on health and well-being.[21,22,55] Of the 3 studies (3 interventions) reporting on dietary intake, 2 found an increase in fruit and vegetable consumption or a reduction in fat intake[21,53]; 1 found no change in the consumption of fruits and vegetables and sweetened beverages.[51] Of the 4 studies that reported on PA outcomes, 3 found significant increases in the number of minutes of PA[21,50,51] while 1 found no change.[55] Among health outcomes, 2 studies assessed and found no change in biomarkers such as blood pressure, cholesterol, or insulin as a result of the multicomponent intervention.[22,53] Five studies examined anthropometric outcomes; 3 found that multicomponent interventions resulted in a reduction of BMI or waist circumference[50,53,54] while 2 found no change.[51,52] Finally, 2 studies found that mental health indicators (eg, depressive symptoms, stress, weight stigma) improved as a result of the multicomponent intervention.[21,22] Findings from the school-based studies indicate that PA improved in 1 study[21] and did not change in another[55]; dietary intake improved in the 1 study that assessed it[21]; mental health improved in both studies that assessed it[21,22]; sleep improved in 1 study[21]; and biomarkers did not change in the study that assessed them.[22]

DISCUSSION

Employee health and well-being programs are designed to encourage employees and teach them ways to improve their physical or mental health. These programs are gaining prominence; as of 2020, 52% of US companies provided health and well-being programs.[56] A 2016 survey found that among school districts, 54.0% required schools to have an employee wellness program, but fewer districts required schools to have someone to oversee or coordinate employee wellness programs (30.6%) or provided funding for or offered health risk appraisals for employees (40.7%).[57] While this review revealed a dearth of research on employee health and well-being interventions in school settings (N = 4), the findings of these 4 studies highlight multiple intervention strategies such as behavioral change campaigns that are applicable to school staff and support nutrition and PA.[20–22,55] This review revealed that across all settings and types of interventions, while findings were mixed, multi-component interventions appeared to more consistently

improve health behaviors and health outcomes among employees than the other intervention types. Educational interventions were the most common employee health and well-being interventions. In particular, many of these educational interventions used evidence-based lifestyle change programs which are part of the DPP.[58] DPP is a program that school districts and schools can consider adopting and implementing to support employees. It is designed for adults at high risk of developing type 2 diabetes but it has not been tested in the school setting or teacher and staff populations. Behavioral cue strategies, such as alerts and prompts designed to disrupt sedentary behavior and foster activity breaks, positively affected PA in 2 of the 3 studies that used these strategies. All environ mental interventions showed slight positive effects or no change. Specifically, environmental intervention strategies, including standing workstations, were effective in increasing PA time and reducing sedentary time, but there were no effects on biomarkers and anthropometric outcomes. While the 1 school study using environmental interventions only assessed dietary intake and found mixed results,[20] positive outcomes related to PA from environmental studies in other settings suggest could be relevant and meaningful to the school setting.[42,43,46] Environmental interventions can be valuable either independently or as part of a multicomponent strategy as a large number of staff are exposed to the intervention by their very presence of "being in the environment." The impact of employee health and well-being interventions on health outcomes was mixed. Many educational and multicomponent interventions demonstrated reductions in BMI, body weight, and waist circumference. Mental health outcomes such as depressive symptoms and stress were also measured in 6 studies, and 4 showed improvements,[21,22,33,42] while the rest had null results.[31,38] Finally, there was a lack of improvement in biomarkers as a result of employee health and well-being interventions. This finding mirrors similar work that suggests possible reasons including limited follow-up duration and inclusion of biomarkers as secondary outcomes.[59]

Overall, multicomponent interventions demonstrated the most promising outcomes related to dietary behaviors, PA behaviors, anthropometric outcomes, and mental health indicators, although the number of studies evaluating each were small. Three of the 4 school-based studies within this review were multicomponent in nature, and while the outcomes measured across the studies varied, there were promising results (eg, improvements in PA, dietary intake, mental health). However, more research into interventions is needed to be able to take such approaches to scale. These multicomponent interventions offered a mix of strategies including educational, behavioral, and environmental, which is an approach recommended by CDC as an effective approach to improving the physical and mental health of employees.[60]

This systematic review also revealed a lack of assessment of organizational culture and supports; both play a key role in promoting health in the workplace, and a lack of organizational support can increase job stressors, leading to burnout.[61] Teacher retention efforts might include employee wellness programs to help educators manage and reduce their stress, which is inextricably linked to mental health. Based on this review, few studies have examined the mental health outcomes of employee health and well-being programs; yet staff that perceive their workplace as being supportive of health and well-being tend to

have better mental and physical health outcomes than those that do not feel a similar level of support.[62]

Employers of all sizes can implement employee health and well-being interventions with success. However, an employee health and well-being program is just 1 component of a comprehensive strategy to support staff health, well-being, and retention. Other structural features, such as sick leave policies and affordable health insurance options complement employee health and well-being programs and have the potential to not simply benefit the employee, but the organization as a whole. As an employer, schools can also benefit from implementing employee health and well-being programs and complementary structural features affecting not only staff but also students. Healthy school staff who are ready to educate may serve as great role models for students. However, the findings of the review shed light on a range of intervention strategies that can support nutrition and PA among workplace employees, and schools can consider adapting these strategies to meet the needs of teachers and school staff.

Limitations

The introduction/methods article[15] outlines some limitations of our overall methodology, including the potential for social desirability bias and detection bias inherent in studies that do not use blinding. Some additional limitations should be noted. When compared to educational interventions (16 educational interventions), only a small number of studies included other types of interventions (ie, 3 behavioral, 9 environmental, 8 multicomponent) which limits our understanding of the effectiveness of these interventions. In addition, very few studies included postintervention follow-up data or allowed a sufficient follow-up period; thus, long-term outcomes are unknown. Studies with longer follow-up are needed to observe significant change in outcomes such as biomarkers which can be impactful at the individual level and to further evaluate effectiveness of interventions. While these results give insight into the effectiveness of workplace health and well-being programs, the lack of school specific workplace studies is a major limitation. More research in the school setting is needed to address the unique stressors of teachers and school staff as well as the organizational culture of school settings. Furthermore, most studies were implemented in majority white settings, resulting in a lack of diversity of study populations. As a result, little is known about the effectiveness or impact of employee health and well-being interventions on a variety of racial and ethnic groups. Finally, this systematic review primarily draws from individual articles identified through a review of reviews search strategy from 2010 to 2018. As a result, we may have missed some more recent articles; more recent articles are more likely to address a COVID-19 or post COVID-19 work environment which introduces different variables that are likely to negatively influence employee well-being.

IMPLICATIONS FOR SCHOOL HEALTH POLICY, PRACTICE, AND EQUITY

Workplace interventions can improve the health and well-being of staff and are available to all schools, regardless of size. Our results show that a multi-component approach offers the greatest potential for positive outcomes among employees and school staff might benefit. The CDC's Workplace Health Model is a multicomponent approach with a coordinated and

comprehensive set of strategies that address nutrition and PA in addition to multiple risk factors and health conditions.[60] The Model includes program, policy, environmental, and community linkage strategies to help address the needs of employees and outlines a step-by-step process for implementation: conducting a workplace health assessment; planning the program; implementing the program; and determining the program's impact through evaluation.

The Workplace Health Model also can help work-places create equitable programs. Policies, benefits, and environmental supports can be available to most or all workers and can help to create equity. Some of the most effective programs are targeted to those with specific risks or conditions, like the National Diabetes Prevention Program. All school staff can be supported by employee health and well-being programs, increasing the potential for improved health of all staff. Employee health and well-being programs are a good way for schools to support staff physical and mental health.

Conclusions

Employee health and well-being programs are effective for improving the health of staff and organizations as a whole. The findings from this systematic review support the use of multicomponent employee health and well-being programs in the workplace. Research is needed to better understand the impact of employee health and well-being programs in the school setting and with diverse study populations using culturally relevant interventions. In addition, research is needed to better understand the impact of policies that promote school health and the impact of employee health and well-being programs on mental health outcomes. Finally, as the world continues to live in and grapple with the effects of the COVID-19 pandemic, more longitudinal studies are needed to help employers, particularly schools, support the overall health of their staff due to the unique needs resulting from the pandemic.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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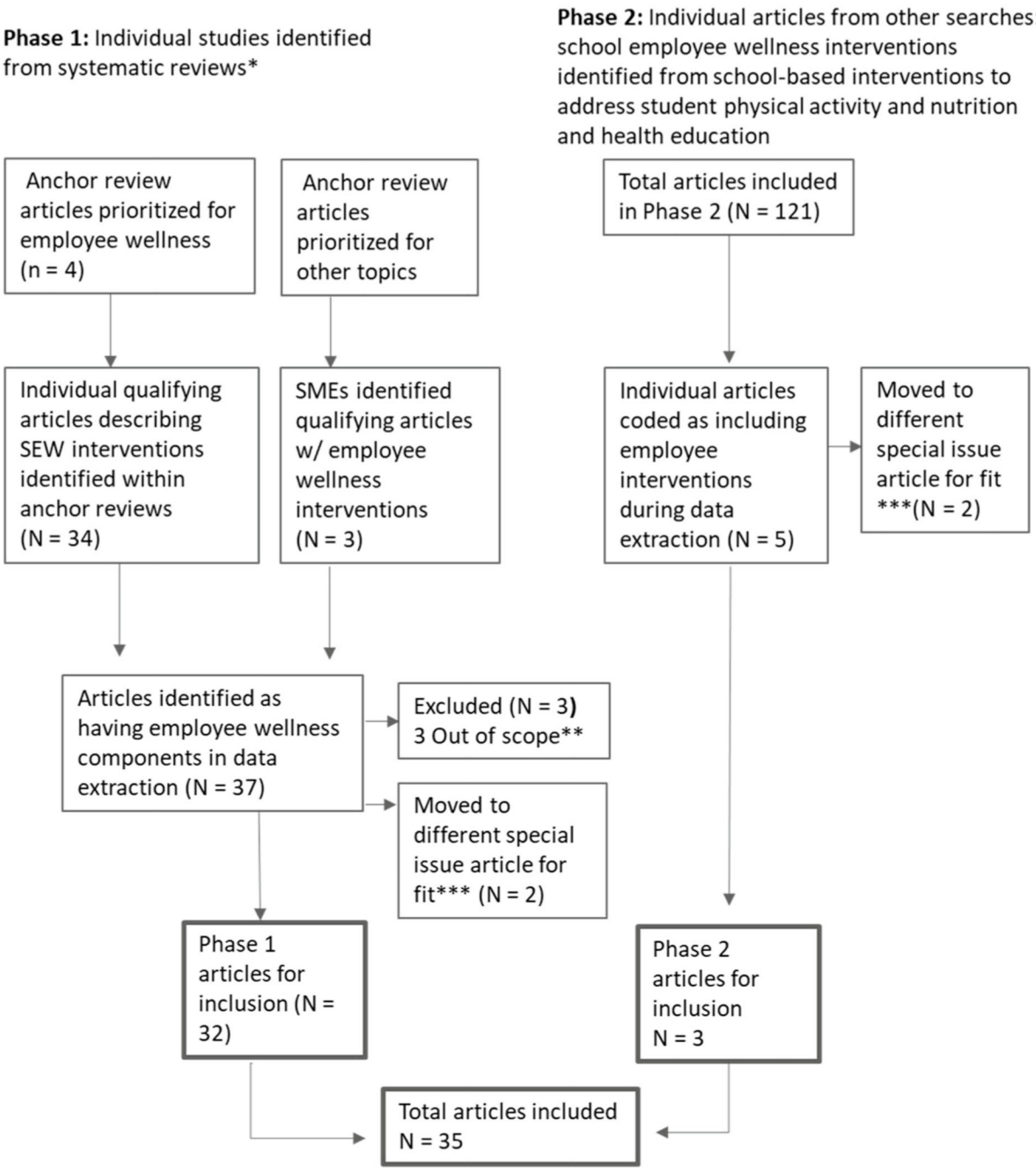

Figure 1. Identifying Articles Describing Employee Health and Wellbeing Interventions SEW, school employee wellness; SME, subject matter expert. *See introduction and methods paper in this special issue for full project flow chart. **Out of scope: Wrong outcomes, process data only, single point in time cross-sectional, wrong date, or wrong topic. ***For example, multicomponent interventions that engaged school employees or had a staff wellness component but did not evaluate the impact on employees were moved to the coordinated approach manuscript.

Abbreviations: SEW, school employee wellness; SME, subject matter expert

* See Introduction and Methods paper in this special issue for full project flow chart.

**Out of scope: Wrong outcomes, process data only, single point in time cross-sectional, wrong date, or wrong topic.

*** For example, multi-component interventions that engaged school employees or had a staff wellness component but did not evaluate the impact on employees were moved to the coordinated approach manuscript.

Table 1.

Search Strategy Used to Identify Peer-Reviewed Publications About Employee Well-being

Topic	Medline Strategy[†]
Phase 1: Employee Wellness	Occupational health services OR Worksite health OR Workplace health OR work site health OR work place health OR Worksite wellness OR Workplace wellness OR work site wellness OR work place wellness OR Worksite fitness OR Workplace fitness OR work site fitness OR work place fitness OR employee health OR employee wellness OR employee assistance program* OR (physical fitness ADJ5 employee*) OR (health promotion ADJ5 employee) AND weight management OR obesity OR diet* OR exercise* OR walking OR healthy living OR healthy choices OR (smoking ADJ5 cessation) OR (tobacco ADJ5 cessation) OR tobacco control OR gymmembership* OR gymbenefit* OR wellness polic* OR physical fitness OR physical activity OR chronic disease OR cardiovascular disease OR hypertension OR diabetes OR lifestyle program* OR life style program* OR wellness program* AND (Review* OR meta-analys* OR metaanalys*).ti,pt.Limit English; 2010-
Phase 2	Individual school-based employee health and well-being articles identified fromprevious tailored searches on school-based interventions to address student physical activity, nutrition, and health education

[†]The MEDLINE search strategy was run first and then modified for queries in the 6 other databases.

Table 2.

Results Summary for Employee Health and Well-being Interventions

Study Participant Characteristics				Intervention Outcomes			
				+: Supports Hypothesis; =: No Effect; —: Does Not Support Hypothesis*			
				"+" and "−" Statistically Significant			
Intervention Strategy/Type (N of Interventions†)	**Study Design‡**	**Employer Size§**	**Race/Ethnicity‖**	**Knowledge, Attitudes, Perceptions¶ (Self-Efficacy)**	**Dietary Outcomes¶**	**Physical Activity Outcomes¶**	**Health Outcomes¶ (Anthropometry, Biomarkers, Mental health)**
Behavioral	RCT/CCT (n = 3)	Small (n = 0)	Majority white (n = 3)	Total reporting outcome:	Total reporting	Total reporting	Total reporting outcome:
interventions		Medium (n = 0)	Majority black (n = 0)	n = 0	outcome: n = 0	outcome: n = 3	n= 1
(N = 3)		Large (n = 0) Not specified (n = 3)	Majority Hispanic/ Latino (n = 0) Majority racial and ethnic minority groups (n = 0) Not specified (n = 0)			+ (n = 2) = (n = 1) − (n = 0)	+ (n= 1) = (n = 0) − (n = 0)
Educational	RCT/CCT (n = 4)	Small (n = 3)	Majority white (n = 7)	Total reporting outcome	Total reporting	Total reporting	Total reporting outcome
interventions	QED(n = 11)	Medium (n= 1)	Majority black (n= 1)	(KAP): n = 3	outcome: n = 4	outcome: n = 8	(biomarkers): n = 12
(N= 16)		Large (n = 7)	Majority Hispanic/ Latino (n = 1)	+ (n = 3)	+ (n = 2)	+ (n = 5)	+ (n = 2)
		Not specified (n = 4)	Majority racial and ethnic	= (n = 0)	= (n= 1)	= (n = 3)	= (n = 7)
			minority groups (n = 3)	− (n = 0)	− (n= 1)	− (n = 0)	− (n = 3)
			Not specified (n = 3)	Total reporting outcome (Self-efficacy): n = 2 + (n= 1) = (n = 1) − (n = 0)			Total reporting outcome (anthropometry): n = 15 + (n = 8) = (n = 4) − (n = 3) Total reporting outcome (mental health): n = 3 + (n= 1) = (n = 2) − (n = 0)

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Study Participant Characteristics				Intervention Outcomes			
				+: Supports Hypothesis; =: No Effect; —: Does Not Support Hypothesis*			
				"+" and "−" Statistically Significant			
Intervention Strategy/Type (N of Interventions†)	**Study Design‡**	**Employer Size§**	**Race/Ethnicity‖**	**Knowledge, Attitudes, Perceptions¶ (Self-Efficacy)**	**Dietary Outcomes¶**	**Physical Activity Outcomes¶**	**Health Outcomes¶ (Anthropometry, Biomarkers, Mental health)**
Environmental	RCT/CCT (n = 5)	Small (n = 2)	Majority white (n = 7)	Total reporting outcome:	Total reporting	Total reporting	Total reporting outcome
interventions	QED (n = 4)	Medium (n = 4)	Majority black (n= 1)	n = 0	outcome: n = 3	outcome: n = 5	(biomarkers): n = 2
(N = 9)		Large (n = 3)	Majority Hispanic/ Latino (n = 0)		+ (n = 2)	+ (n = 3)	+ (n = 0)
		Not specified (n = 0)	Majority racial and ethnic minority groups (n = 0) Not specified (n = 1)		= (n = 2) − (n = 0)	= (n = 2) − (n = 0)	= (n = 2) − (n = 0) Total reporting outcome (anthropometry): n = 5 + (n = 0) = (n = 5) − (n = 0) Total reporting outcome (mental health): n = 1 + (n= 1) = (n = 0) − (n = 0)
Multicomponent Interventions (N = 8)	RCT/CCT (n = 3) QED (n = 5)	Small (n = 2) Medium (n= 1) Large (n = 5) Not specified (n = 0)	Majority white (n = 5) Majority black (n = 0) Majority Hispanic/ Latino (n = 0) Majority racial and ethnic minority groups(n= 1) Not specified (n = 2)	Total reporting: outcome n = 0	Total reporting: outcome n = 3 + (n = 2) = (n= 1) − (n = 0)	Total reporting outcome: n = 4 + (n = 3) = (n = 1) − (n = 0)	Total reporting outcome (biomarkers): n = 2 + (n = 0) = (n = 2) − (n = 0) Total reporting outcome (anthropometry): n = 5 + (n = 3) = (n = 2) − (n = 0) Total reporting outcome (mental health): n = 2 + (n = 2) = (n = 0) − (n = 0)

KAP, knowledge, attitudes, perceptions; QED, quasi-experimental design; RCT/CCT: randomized control trial or controlled clinical trial.

*Examples of outcomes that support hypothesis and would be coded include (+): increased nutrition knowledge, increased physical activity, decreased sugar sweetened beverage intake, decreased sedentary time.

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† Interventions refers to the set of practices, policies, or approaches tested within a study. One research study (Dallam & Foust, 2013) included 2 intervention arms, each arm counted as a separate intervention for a given outcome in this table.

‡ QED could be: 2-group cohort, including regression discontinuity; 1-group cohort; interrupted time series; repeat cross-sectional. Studies refers to interventions within the same population/sample, following the same protocol or trial registration.

§ Employer size: Small: 1–250 employees; Medium: 251–750 employees; Large: 751 or more employees.

// Majority defined as >50% of the study population.

¶ Totals for measured outcomes may exceed the number of interventions evaluating a given outcome because a single intervention may be counted more than once if it reports mixed findings; for example, an intervention that reported increased consumption of fruits but not vegetables would count as both a (+) and (=) for dietary intake. Similarly, the number of interventions may exceed the number of articles since a study may have more than 1 intervention arm.