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A Scoping Review of School-Based Physical Activity and Health Eating/Nutrition Interventions

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Abstract

This article presents a scoping review of school-based interventions designed to promote and develop physical activity and/or healthy eating/nutrition. Using three common electronic databases for education, physical education, and health education research literature (ERIC, ProQuest, & SPORTDiscus), a search was conducted for peer-reviewed publications between 2000 and 2015. A total of 43 studies met the search criteria for this scoping review and were consequently subject to a more-detailed examination. Twenty-two of these were related to physical activity (PA), 14 were related to healthy eating/nutrition (HEN), and seven were related to physical activity and healthy eating/nutrition (PA & HEN). Results from this scoping review should be of interest and relevance to researchers, curriculum developers, and teachers engaged in program development and implementation related to physical activity and/or healthy eating/nutrition in school settings.

Keywords: physical activity, healthy eating, nutrition, review, schooling, education

Résumé

Cet article présente une revue de littérature thématique sur des interventions en milieu scolaire visant la promotion et le développement de la pratique d'activité physique et / ou de la saine alimentation. Une recherche de publications évaluées par les pairs entre 2000 et 2015 a été menée à l'aide de trois bases de données portant sur l'éducation, l'éducation physique et à la santé (ERIC; ProQuest et SPORTDiscus). Un total de 43 études répondaient aux critères de recherche et ont été examinées de façon plus approfondie. De ces études, 22 portaient sur l'activité physique, 14 sur la saine alimentation et sept sur l'activité physique et la saine alimentation. Les résultats de cette revue de littérature devraient être d'intérêt et pertinents pour les chercheurs, les personnes qui développent des programmes et les enseignants engagés dans le développementde programmes sur l'activité physique et la saine alimentation dans des milieux scolaires.

Mots clés: activité physique, saine alimentation, nutrition, revue, école, education.

Introduction

In recent years, there has been an increased interest in the development and implementation of school-based interventions related to wellness. Very often these school-based interventions have been related to physical activity and/or healthy eating/nutrition (e.g., see Cale & Harris, 2006; De Bourdeaudhuij et al., 2011). Furthermore, many of these interventions have been developed and implemented in response to the perceived short- and long-term health consequences related to child and youth inactivity and/or unhealthy eating practices (Armstrong & Van Mechelen, 1998; Cale & Harris, 2005; Centers for Disease Control [CDC], 2009). Notwithstanding the potential issues related to this line of reasoning—related, for example, to reinforcing obesity discourses (e.g., see Anderson, 2012; Wright, 2009) or enacting deficit-model approaches (e.g., see Leahy, Burrows, McCuaig, Wright, & Penney, 2016; McCormack, McBride, & Paasche-Orlow, 2016)—individuals and institutions are responding by way of introducing health-based interventions into school communities.

Schools, in many ways, present ideal contexts and environments in which to introduce these sorts of intervention programs. Certainly, schools have long been recognized as potentially effective settings for many public health initiatives (Naylor & McKay, 2009; St. Leger, Kolbe, Lee, McCall, & Young, 2007; World Health Organization [WHO], 1997). This effectiveness is related, most obviously, to the observation that schools present the only space where almost all children and youth can be accessed. Moreover, such access also enables intervention providers/leaders/teachers to engage with children and youth in an environment that lends itself to large-group dissemination, instruction, and education.

Given that all children and youth within Canada (and, indeed, within most Western democracies) must attend school—and that, when there, these children and youth make up a genuine captive audience—school-based interventions have, at the very least, the opportunity to reach many children and youth. Additionally, children and youth spend significant amounts of time within schools; they spend half of their waking hours within them (for up to 13 consecutive years). The introduction of interventions within schools enables change-agents (e.g., teachers, community leaders) to connect with children and youth of all backgrounds, for extended periods of time (Fox, Cooper, & McKenna, 2004; St. Leger et al., 2007). Arguably, there is no better way to connect with all school-aged Canadians than to do so within schools themselves.

School-based interventions also enjoy an additional advantage over many other possible location-dependent interventions; programs can become institutionalized into 'regular' school curriculum and professional development (Stone, McKenzie, Welk, & Booth, 1998). However, those familiar with school contexts would also recognize that many barriers to in-school physical activity and/or healthy eating/nutrition interventions also exist. These can be related to insufficient time, competing priorities, encroachment of medical professionals into other professional domains, and non-supportive climates (Franks et al., 2007; Gard & Pluim, 2014; Naylor, Macdonald, Zebedee, Reed, & McKay, 2003; Naylor & McKay, 2009). As such, a review of school-based interventions could provide guidance for those developing and implementing programs.

Canadian School-based Interventions

Within Canada, where education has always been a provincial responsibility, there have been several school-based interventions targeting physical activity and healthy eating/nutrition.

More specifically, these interventions have been related to: (a) physical activity, (b) healthy eating/nutrition, or (c) physical activity and healthy eating/nutrition. Patton and McDougall (2009) provided one of the few summaries of these school-based interventions (related primarily to physical activity) within Canada. They found physical activity interventions such as Alberta's Daily Physical Activity (DPA) initiative (British Columbia and Ontario also have similar DPA programs) and Saskatchewan's In Motion program. Combined physical activity and healthy eating/nutrition interventions included Alberta's APPLE Schools program, Nova Scotia's Active Kids Healthy Kids initiative, and British Columbia's Action Schools! BC program. Healthy eating/nutrition programs are less prevalent and are often industry-aligned or industry-created. For example, the Canadian Dairy Association and its provincial affiliates have developed a variety of in-class healthy eating/nutrition educational resources. While some of these interventions were entirely policy-related (e.g., the introduction of DPA), some also relied upon, in whole or in part, resources for implementation.

Rationale for a Scoping Review of Literature

Although many school-based programs are available for Canadian teachers, few of these have been subject to study. The few that have been researched include British Columbia's Action Schools! BC (Naylor et al., 2003), Ontario's DPA policy (Allison et al., 2014; Stone, Faulkner, Zeglen-Hunt, & Cowie Bonne, 2012), and Alberta's APPLE Schools (Fung et al., 2012; Vander Ploeg, Maximova, McGavock, Davis, & Veugelers, 2014). While the abovementioned researchers have investigated the impact of these three regional programs, there is limited research evidence supporting (or refuting) success stories of any other Canadian programs. Consequently, teachers are often encouraged to implement in-school programs without knowledge of the programs that exist and any evidence of positive effects.

Given this observation, we suggest that a scoping review of literature would be of immediate interest and application to many. More specifically, we believe that a scoping review of literature related to these sorts of school-based interventions is especially suitable for teachers (as well as teacher educators and researchers). With the results of this scoping review in hand, those responsible for implementing programs would be able to know which programs exist and, more importantly, be more discerning when contemplating programs or interventions for use in their classrooms and schools. Additionally, by offering a summary of somewhat similar school-based interventions, those charged with developing such programs for school communities might come to know what interventions and intervention features have been found to have positive effects. Certainly, the pedagogies and practices of similar school-based interventions programs that have been found (through research-based evidence) to improve children's physical activity and/or healthy eating/nutrition ought to be known by those engaged with these sorts of efforts.

Unlike traditional systematic reviews, our scoping review is meant to provide a "snapshot of a particular topic" (Booth, Papaioannou, & Sutton, 2012, p. 19) rather than a critical assessment of research quality. As McEvoy, MacPhail, and Heikinaro-Johansson (2015) suggested in their recent scoping review of physical education teacher educators, "this is not to say that [scoping] reviewers do not value research quality, rather the purpose is one of charting, not evaluating" (p. 163). With respect to Anderson, Allen, Peckham, and Goodwin's (2008) range of scoping reviews (ranging from general accounts to "just short" of systematic reviews), we would suggest that this scoping review is nearer the "right" end of this spectrum. Moreover, our undertaking of this literature review has allowed us to meet two previously identified reasons

for selecting a scoping process (see Arksey & O'Malley, 2005). Firstly, we examined the extent, range, and nature of research related to a topic, and secondly, we aimed to summarize and disseminate these research findings. Finally, we certainly recognize that a systematic review offers more, in many respects, than does a scoping review. However, we have chosen a scoping review process for two primary reasons. Firstly, given the absence of such a review in the literature, a scoping review can offer an important initial account of the related research-to-date related to this topic—a precursor to a more systematic process, and given the scope and audience of this particular journal, we wish to provide information that may be of use to, and accessible by, both practitioners and academics.

Methods

Search Protocol

A literature search of school-based interventions intended to promote and develop physical activity and/or healthy eating/nutrition was conducted using three common electronic databases: Educational Resources Information Center (ERIC), ProQuest Research Library (ProQuest), and SPORTDiscus. The databases were chosen because they encompass a comprehensive catalogue of education, physical education, and health education literature.

The searches were limited to English peer-reviewed articles published between 1 January 2000 and 31 December 2015. Two separate searches (for full text within all text) were completed for each database: (a) school-based, intervention, and physical activity, and (b) school-based, intervention, and healthy eating or nutrition. Moreover, given the large number of initial ProQuest research results (i.e., 9103), the ProQuest search results were further limited by country of origin to include Canada, the United States, Australia, New Zealand, the United Kingdom, and all other Western European nations. (Given that we are situated in Western universities, and we work largely with local schools and teachers in Western contexts, we chose to limit the extent of the search to these demographics.) Once all exact and close duplicates were removed, a total of 1369 articles were screened based on the titles and abstracts. This initial screening process focused on suitability for consideration. That is, only peer-reviewed research-based publications that focused specifically on in-school physical activity and/or healthy eating/nutrition interventions (and outcomes) were chosen for a closer consideration. Finally, at this point, additional articles were added based on expert input and/or reference list checks. This resulted in 95 articles that were subject to a more detailed review.

Detailed Review Inclusion Criteria

The detailed review process required us to read the remaining 95 articles in full because their titles and abstracts did not provide sufficient information to include or exclude them. Inclusion criteria were related to target areas, research methodology, in-school programs, and target age groups (and also to the previously mentioned countries). Any articles that did not report on research results related to either of the two target areas (physical activity, healthy eating/nutrition) were excluded from the literature review. Appropriate research methodologies included those that were experimental/empirical (including pilot studies, controlled trials, and randomized controlled trials) as well as those that were descriptive or qualitative in nature. Those that did not include in-school interventions (e.g., community, before-school, or after-school interventions) or did not target students aged 5 to 18 were also excluded. Moreover, all research articles included within this review focused upon interventions that included

instructional/educational components. For example, they might have included lesson/unit plans and/or other print or online educational resources. So, for example, interventions such as additional recess time, DPA, or stand-alone morning breakfast programs would not have been included. The detailed review excluded a further 53 articles, resulting in 42 in all. Twenty-one of these were related to physical activity (PA), 14 were related to healthy eating/nutrition (HEN), and seven were related to physical activity and healthy eating/nutrition (PA & HEN; see Figure 1). It should be noted, here, that our use of these three databases (ERIC, ProQuest, and SPORTDiscus) necessarily presents a limitation of our scoping review; a broader search of additional databases (e.g., JSTOR) may have uncovered additional relevant literature.

Figure 1. Literature Search Results

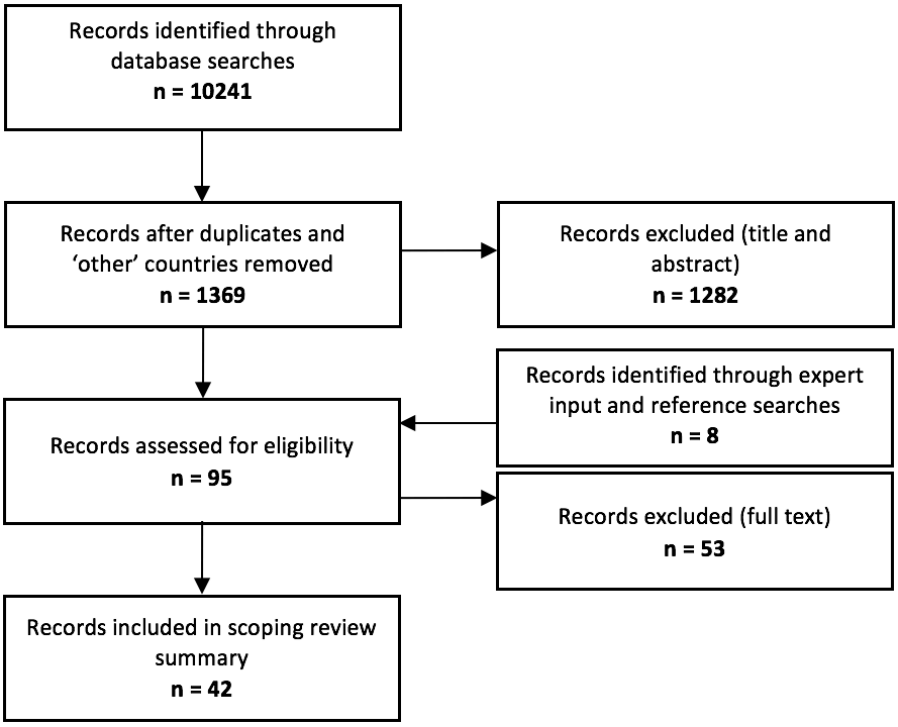

Figure 1. Literature search results from a literature search of school-based interventions intended to promote and develop physical activity and/or healthy eating/nutrition using three common electronic databases (ERIC, ProQuest ProQuest, SPORTDiscus). The searches were limited to English peer-reviewed articles published between 1 January 2000 and 31 December 2015. Two separate searches (for full text within all text) were completed for each database: (a) school-based, intervention, and physical activity, and (b) school-based, intervention, and healthy eating or nutrition.

Results

In order to be able to contrast these studies, a number of variables and outcomes were closely considered. These included: target outcome(s) (physical activity, healthy eating/nutrition, both), target population(s) (e.g., Aboriginal populations, newcomer immigrant populations, low-income populations, "other" populations, general population), intervention program types, and

research design and results. As has been categorized elsewhere (e.g., Kahn et al., 2002; Quitério, 2012; Stone et al., 1998), herein intervention program types have been identified as modified physical education (MPE), modified health education (MHE), classroom (CR), or whole school (WS). Research designs include controlled trials (CT), randomized controlled trials (RCT), and "other" (e.g., intervention study). Tables 1, 2, and 3 highlight the physical activity, healthy eating/nutrition, and physical activity and healthy eating/nutrition studies respectively. Each table provides the target population, research design, sample, intervention group, intervention program and its category, results, and, if applicable, statistical significance. Additional acronyms included in Tables 1, 2, and 3 include the following: F+V (fruit[s] and vegetable[s]), FU (follow-up duration), IL (intervention length), NR (not reported), OEN (other European nation[s]), and PI (post-intervention length).

Table 1
School-based Interventions Targeting Physical Activity

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Alstot, 2012, USA	General MPE	other (alternating treatments design)	n = 10 mean age = NR (grade 3 students; co-ed)	(1) intervention group × 1 classroom (10 students)	(1) **Peer-administered token economy (PTE)**: reinforcement-based system to increase jump rope behaviours of elementary physical education students; consisted of 10 sessions over 2 months	IL: 2 months PI: 2 months	PI: all but one student increased mean number of successful jumps from baseline	NR
Araújo-Soares et al., 2009, OEN (Portugal)	General MHE	CT	n = 291 mean age = 12.1 yrs (grades 6 & 7 students; co-ed)	(1) intervention group (BODY) × 8 classes (134 students) (2) control group × 8 classes (157 students)	(1) **It's your body – use it well! (BODY)**: classroom-based intervention to increase levels of MVPA in adolescents; consists of 12 90-min weekly sessions on a variety of health topics (2) usual school activities	IL: 14 weeks PI: 14 weeks FU1: 3 months FU2: 9 months	PI, FU1, & FU2: (1) > (2) increase MVPA	PI & FU1: NS FU2: $p < .01$
Butcher et al., 2007, UK	Low SES WS	RCT	n = 177 mean age = 9.12 yrs (grades 3-7 students; co-ed)	(1) intervention group (FB) × 1 school (52 students) (2) intervention group (FB+I) × 1 school (50 students) (3) control group × 1 school (39 students)	(1) **Physical Activity Feedback (FB)**: pedometer feedback for children to view step-counts achieved at school (2) **Feedback plus physical activity information (FB+I)**: step-count feedback and received information and ideas on how to increase steps per day (3) usual school activities; no step-count feedback or information	IL: 1 week PI: 1 week	PI: (2) > (1) > (3) steps per minute	PI: (2) $p = .003$ and $p = .0001$
Cardon et al., 2009, OEN (Belgium)	General MHE & CR	RCT	n = 502 mean age = 9.7 yrs (grades 4 & 5 students, co-ed)	(1) intervention group (SPARK-SM) × 8 schools (502 students) (2) control group × 8 schools (students NR)	(1) **SPARK Self-management program (SPARK-SM)**: health-related physical education curriculum and classroom-based self-management lessons to promote PA out of school; includes cognitive and behavioural skills (2) usual school activities	IL: 1 year PI: 1 year	PI: more than half of students (1) reported being more active	PI: $p < .01$
Cecchini et al., 2014, OEN (Spain)	General MPE	CT	n = 447 mean age = 14.34 yrs (co-ed)	(1) intervention group × 4 schools (223 students) (2) control group × 4 (224 students)	(1) **Epstein's TARGET Strategies**: task (design of activities), authority (location of decision-making), recognition (use of rewards), grouping (group formation), evaluation (assessment criteria), and time (pace of instruction); used to measure adolescents' intentions to be physically active and leisure-time physical activity (LTPA) levels (2) usual physical education classes	IL: 12 weeks PI: 12 weeks FU: 3 months	PI & FU: (1) > (2) in intentions to be physically active and time spent in LTPA	PI & FU: $p < .001$

Table 1 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Chatzisarantis & Hagger, 2009, UK	General, WS	RCT	n = 215 mean age = 14.8 yrs (co-ed)	(1) intervention group (A-S) × 8 schools (52 students) (2) intervention group (LA-S) × 8 schools (52 students)	**Self-Determination Theory Intervention**: school-based intervention to change students' PA intentions and leisure time PA behaviour (1) Autonomy-supportive intervention (A-S): provided rationale, feedback, choice, and acknowledged difficulties associated with physical education classes (2) Less autonomy-supportive intervention (LA-S): provided rationale and feedback only	IL: 5 weeks PI: 5 weeks FU: 5 weeks	PI: (1) increase PA intentions and behaviour	PI: $p < .05$
Christodoulos et al., 2006, OEN (Greece)	General, MPE, MHE, & WS	RCT	n = 78 mean age = 11.2 yrs (grade 6 students; co-ed)	(1) intervention group (CPE) × 1 school (29 students) (2) control group × 1 school (49 students)	(1) **Comprehensive Physical Education Intervention (CPE)**: curriculum-based PA and health program; consists of PA education, cooperative games, family involvement, and community PA information (2) usual school activities	IL: 1 year PI: 1 year	PI: (1) > (2) organized PA PI: (1) > (2) positive attitudes and intentions to participate in PA PI: (1) > (2) 60 minutes MVPA per day	PI: $p < .02$ PI: $p < .05$ and $p < .027$ PI: $p < .043$
de Meij et al., 2011, OEN (Netherlands)	Low SES, WS	CT	n = 2848 mean age = 8.6 yrs (grades 3-8 students; co-ed)	(1) intervention group (JUMP-in) × 9 schools (1378 students) (2) control group × 10 schools (1451 students)	(1) **JUMP-in program**: school-based strategy combining environmental policy, neighbourhood, parents, and personal components (2) usual school activities	IL: 8 months PI: 8 months FU: 9 months	PI and FU: (1) > (2) increase organized sports participation	NR
Duncan et al., 2012, UK	General, WS	other	n = 59 mean age = 10.7 yrs (co-ed)	(1) intervention group (VPW) × 2 schools (59 students)	(1) **Virtual Pedometer Walk intervention (VPW)**: school-based PA intervention to increase habitual PA; consisted of a integrated curriculum model during the whole school day	IL: 4 weeks PI: 4 weeks	PI: (1) increase PA PI: Normal weight children > overweight or obese children for average daily steps	PI: $p < .005$ PI: $p = .003$

Table 1 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Erwin et al., 2011, USA	General, CR	CT	n = 106 mean age = 10.1 yrs (grades 3-5 students; co-ed)	(1) intervention group (TDC) × 1 school (students NR) (2) control group × 1 school (students NR)	(1) **Teacher-Directed Classroom Intervention (TDC)**: classroom-based activity breaks implemented by teachers; consisted of at least one 5-10 minute activity break per school day (2) usual school activities	IL: 8 days PI: 8 days FU: 3 months	PI and FU: (1) > (2) in mean average steps per school day	PI: $p < .001$
Fairclough & Stratton, 2006, UK	General, MPE	CT	n = 62 mean age = NR (grade 7 students; girls)	(1) intervention group (MPE) × 1 classroom (students NR) (2) control group × 1 classroom (students NR)	(1) **Modified PE (MPE) lesson**: modified PE instruction to maximize time children spend being physically active; 82 min modified gymnastics unit focusing on PA (all girls) (2) usual 76 min PE gymnastics unit (co-ed)	IL: 5 weeks PI: 5 weeks	PI: (1) increase in MVPA	PI: $p < .05$
Haerens et al., 2006, OEN (Belgium)	General, WS	CT	n = 2991 mean age = 13.1 yrs (grade 7 and 8 students; co-ed)	(1) intervention group (PA&HE) × 5 schools (1006 students) (2) intervention group (PA&HE-P) × 5 schools (1226 students) (3) control group × 5 schools (759 students)	(1) **Physical Activity and Healthy Eating Intervention (PA&HE)**: focus on increasing students' MVPA to 60 minutes per day at school through increasing environmental support and using computer-tailored feedback (2) **Intervention with Parent Involvement (PA&HE-P)**: addition of meetings, newsletters, and CDs to encourage parental involvement to help support behaviours outside of school (3) usual school activities	IL: 2 years PI1: 1 year PI2: 2 years	PI2: boys (1) and (2) > (3) in PA PI2: girls (1) and (2) > (3) decrease light PA PI2: girls (1) and (2) > (3) decrease fat intake	PI2: boys $p < .05$ PI2: girls $p < .05$ PI2: girls $p < .05$
Hardman et al., 2011, UK	General, CR	CT	n = 386 mean age = 9.1 yrs (grade 3-6 students, co-ed)	(1) intervention group (FNF) × 2 schools (118 students) (2) intervention group (FNF-NR) × 2 schools (67 students) (3) control group × 2 schools (51 students)	(1) **Fit N Fun Dude (FNF)**: peer-modeling materials and daily pedometer step goals and rewards (2) **Fit N Fun Dude with no rewards (FNF-NR)** (3) pedometers only	IL: 16 weeks PI: 14 weeks	PI: (1) > (2) and (3) increase in steps per day PI: (2) > (3) increase in steps per day PI: (2) increase in steps per day	PI: $p = .001$ PI: $p = .019$ PI: $p = .001$

Table 1 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Kang & Brinthaupt, 2009, USA	General, WS	other	n = 99 mean age = NR (grade 4 students, co-ed)	(1) intervention group (ISG) × 2 schools (42 students) (2) intervention group (GSG) × 2 schools (57 students)	**School-based Pedometer Intervention**: consists of a 2-week baseline and a 6-week school-based pedometer intervention (1) Individual-based step goals (ISG): created by increasing the participants' individual average number of steps taken (2) Group-based step goals (GSG): created by increasing the entire class's average number of steps taken	IL: 6 weeks PI: 6 weeks	PI: (1) > (2) increase in step counts	PI: $p < .001$
Morris et al., 2013, UK	General, WS	CT	n = 378 mean age = 9.75 yrs (co-ed)	(1) intervention group (GAP) × 2 schools (177 students) (2) control group × 2 schools (201 students)	(1) **Great Activity Program (GAP)**: includes highlight events, educational material, interactive website, and vacation activity planners (2) usual PE and health curriculum	IL: 7 months PI: 7 months	PI: (1) > (2) increase in daily steps, total MVPA, and bouts of MVPA	PI: $p < .05$
Oliver et al., 2006, AUS/NZ	General, CR	other (intervention study)	n = 78 mean age = NR (grade 5 & 6, co-ed)	(1) intervention group (ICA) × 3 classrooms (61 students)	(1) **Integrated-Curriculum Approach (ICA)**: school-based PA intervention to increase habitual PA by completing a virtual walk; consisted of an integrated curriculum model during the whole school day	IL: 4 weeks PI: 4 weeks	PI: (1) decrease PA PI: students more active on intervention weekdays than weekend days	PI: $p < .0001$ PI: $p < .0001$
Naylor et al., 2003, CAN	General, WS	CT	n = 91 (teachers)	(1) intervention group (AS! BC with liaison) x 7 schools (2) intervention group (AS! BC with liaison and champion) x 3 schools (3) control group (usual practice) x 3 schools	(1) **AS! BC with liaison**: teachers had weekly support with a school facilitator who would mentor and demonstrate (2) **AS! BC with liaison and champion**: the liaison provided training and support to a school-site champion—one who would support colleagues (3) usual PE and PA activities	IL: 11 months	PI: PA for (1) and (2) greater than (3) overall	PI: $p < .0001$

Table 1 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Pangrazi et al., 2003, USA	General, CR	CT	n = 606 mean age = 9.8 yrs (co-ed)	(1) intervention group (PLAY only) × 9 schools (2) intervention group (PLAY + PE) ×10 schools (3) control group (PE only) × 10 schools (4) control group (no treatment) × 6 schools (128 students)	(1) **Promoting Lifestyle Activity for Youth (PLAY) Intervention**: focuses on PA and does not teach physical skills; supplements a daily PE program; places responsibility for PA on the classroom teacher, who becomes a model for helping children develop active lifestyles (2) PLAY+PE intervention (3) usual school program (with PE) (4) usual school program (without PE)	IL: 12 weeks PI: 12 weeks	PI: (1) > (4) steps per day (girls and boys) PI: (2) > (4) steps per day (girls and boys) PI: (2) and (3) > (4) steps per day (girls)	PI: NS PI: $p = .01$ PI: $p = .006$
Quaresma et al., 2014, OEN (Portugal)	General, WS	RCT	n = 1042 mean age = 10.4 yrs (grades 5-7 students, co-ed)	(1) intervention group (PESSOA) × schools NR (835 students) (2) control group × schools NR (207 students)	(1) **Physical Activity and Family-based Intervention in Pediatric Obesity Prevention (PESSOA)**: addresses personal, social, and physical environmental factors that influence PA and health; includes 90-min weekly sessions with health and weight educational program and PA activities (2) usual school activities with general information regarding eating and PA behaviours	IL: 2 years PI: 2 years	PI: (1) decrease PA	PI: NS
Siegrist et al., 2013, OEN (Germany)	General, MHE	CT	n = 724 mean age = 8.4 yrs (grades 2 & 3 students, co-ed)	(1) intervention group (JTUM) × 4 schools (427 students) (2) control group × 4 schools (297 students)	(1) **JuvenTUM Intervention (JTUM)**: educates children, teachers, and parents to live active and healthy lifestyles; also alters school environmental settings to promote more physical activity; includes 10 health-related lessons (2) usual school activities	IL: 1 year PI: 1 year	PI: (1) > (2) increase in daily PA	PI: $p < .001$
Vander Ploeg et al., 2014, CAN	Low SES, WS & MHE	other (intervention study)	n = 637 mean age = NR (grade 5)	(1) intervention group (APPLE Schools) x 10 schools (394 students) (2) control group x 20 schools	(1) **APPLE Schools**: a multi-component school-based intervention that relies upon a site facilitator to implement healthy eating and active living strategies (e.g., by contributing to school health curriculum, engaging parents, offering professional development, etc.) (2) usual school activities	IL: 2 years	PI: (1) > (2) increase in daily PA	PI: $p < .05$

Table 2
School-based Interventions Targeting Healthy Eating/Nutrition

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if available or applicable)
Bere et al., 2006, OEN (Norway)	General, MHE & WS	RCT	n = 369 mean age = 11.3 yrs at baseline, 12.0 yrs at FU1, and 13.0 yrs at FU2 (co-ed)	(1) intervention school (FVMM) × 9 schools (190 students) (2) control school ×10 schools (179 students)	**Fruits and Vegetables Makes the Marks (FVMM)**: school-based F+V intervention consisting of a home economics classroom component, parental involvement, and encouraged participation in the Norwegian School Fruit Programme; consists of 7 sessions (1) FVMM intervention (2) encouraged participation in the School Fruit Programme and usual activities	IL: 7 months FU1: 10 months FU2: 14 months	FU1 and FU2: (1) and (2) decrease F+V intake FU1 and FU2: (1) > (2) awareness of F+V	FU1 and FU2: NS FU1 and FU2: $p <$ .003 and $p <$ .01
Birnbaum et al., 2002, USA	other (20% of participants approved for reduced lunch program), CR & WS	RCT	n = 3503 mean age = NR (co-ed)	(1) intervention group (SEI) × 8 schools (845 students) (2) interventions group (SEI+CC) × 8 schools (677 students) (3) interventions group (SEI+CC+PL) × 8 schools (226 students) (4) control group × 8 schools (1755 students)	**Teens Eating for Energy and Nutrition at School (TEENS)**: a school-based nutrition intervention to promote (F+V) intake and decrease fat intake (1) School Environment Intervention (SEI): promotion of F+V and lower fat foods at school lunch, as healthy snacks, and in vending machines (2) Classroom Curriculum (CC): 10 curriculum sessions informed by Social Cognitive Theory (3) Peer Leaders (PL): full-day training and led interactive activities (4) usual school activities	IL: 1 year PI: 1 year	PI: (2) and (3) increase F+V consumption PI: (2) and (3) increase fruit intake and (1) decrease fruit intake; fruit intake (3) > fruit intake (2) PI: (2) and (3) increase vegetable intake PI: (1), (2), and (3) decrease low fat foods intake	PI: (2) NS, (3) $p =$ .012 PI: (2) NS, (3) $p =$ .01, (1) NS PI: (2) and (3) NS PI: (2) $p <$ .001, (3) $p =$ .002
Bjelland et al., 2015, OEN (Norway)	General, WS	RCT	n = 1418 mean age = 11.2 yrs (co-ed)	(1) intervention group (HEIA) × 12 schools (498 students) (2) control group × 25 schools (898 students)	**HEalth In Adolescents (HEIA)**: a comprehensive intervention program to promote consumption of F+V and reduction in sugar-sweetened beverages (SSB) among young adolescent school children; includes individual, group, and environmental level strategies and activities (1) HEIA intervention (2) usual school activities	IL: 20 months PI: 20 months	PI: (1) > (2) fruit consumption PI: (1) < (2) SSB	PI: $p <$ .001 PI: $p =$ .02

Table 2 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if available or applicable)
Blom-Hoffman et al., 2004, USA	other (urban under-resourced school), CR	CT	n = 91 mean age = NR (grades K and 1 students; co-ed)	(1) intervention group (NPP) × 3 classes (2) control group × 3 classes	**Nutrition Promotion Program (NPP)**: a multi-component program consisting of a classroom-based knowledge change component (10 lessons based on 'Every day, Lots of Ways' curriculum), a lunchtime-based behaviour-change component, and a home component (1) NPP intervention (2) usual classroom activities	IL: 7 months PI: 7 months FU: 1 month	PI: (1) > (2) healthy eating knowledge; healthy eating knowledge (1) at PI = FU	PI: $p < .0001$; NS
Cunningham-Sabo & Lohse, 2014, USA	Low SES, CR	CT	n = 961 mean age = NR (grade 3-5 students; co-ed)	(1) intervention group (CWK-CT) × 26 classrooms (440 students) (2) intervention group (CWK-T) × 18 classrooms (226 students) (3) control group × 20 classrooms (312 students)	**Cooking With Kids (CWK)**: school-based experiential nutrition education program (1) consists of 5 2-hour cooking and 5 1-hour F+V tasting lessons (CWK-CT) (2) consists of only 5 1-hour F+V tasting lessons (CWK-T) (3) usual classroom activities	IL: (1): 16 hours and (2): 5 hours over one school year PI: (1): 16 hours and (2): 5 hours over one school year	PI: (1) > (2) > (3) F + V preference PI: (1) and (2) increase V preference PI: (1), (2), and (3) increase F preference	PI: (1) $p = .045$ PI: (1) and (2) $p < .05$ PI: NS
Jones et al., 2011, USA	Low SES, MPE & MHE	CT	n = 104 mean age = NR (grade 3-5 students; co-ed)	(1) intervention school 1 (22 students) (2) intervention school 2 (33 students) (3) control school × 3 schools (49 students)	**Youth Can! (YC)**: youth leaders trained in research, advocacy; and nutrition; includes 12 1-hour nutrition and physical activity education lessons from the Coordinated Approach to Child Health (CATCH) (1) F+V snack stand, low fat ice cream, and smaller milk containers (2) encouraged salad and whole fruit consumption (3) CATCH lessons only	IL: 2 years PI: 2 years	PI: (1) > (3) fruit consumption PI: (2) < (3) total energy and fat intake	PI: $p < .001$ PI: $p < .05$
McCarthy et al., 2012, USA	other (low income Caucasian and Hispanic), MHE	CT	n = 1009 mean age = NR (middle school students; co-ed)	(1) intervention group = 454 students (2) control group = 276 students	**Harvest of the Month (HOTM)**: nutrition education intervention program (1) HOTM intervention (2) usual classroom activities	IL: 6 months PI: 6 months	PI: no difference between (1) and (2) with respect to F+V preference PI: (1) > (2) F+V consumption	 PI: NS

Table 2 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if available or applicable)
McCaughtry et al., 2011, USA	General (primarily African American), MHE	CT	n = 2132 mean age = 12.7 yrs (middle school students; co-ed)	(1) intervention school (CONP) × 16 schools (1476 students) (2) control school × 16 schools (656 students)	**Constructivist-Oriented Nutrition Program (CONP)**: two component program including health education teacher professional development and teachers implementing a constructivist-oriented nutrition education curriculum; consists of 6 1-hour lessons (1) CONP intervention (2) usual school activities	IL: 6 weeks PI: 6 weeks	PI: (1) > (2) dietary knowledge PI: (1) > (2) dietary self-efficacy PI: (1) > (2) increased intake of F+V and decreased intake of meats	PI: $p < .001$ PI: $p < .001$ PI: $p < .05$
Newell et al., 2004, AUS/NZ	General, WS	CT	n = 392 mean age = NR (ages 7-8 years; co-ed)	(1) intervention school (TFV) × 9 schools (307 students) (2) control school × 3 schools (85 students)	**Tooty Fruity Vegie Project (TFV)**: whole school approach aimed to create supportive environments to implement F+V educational resources and activities (1) TFV intervention (2) usual school activities	IL: 2 years PI: 2 years	PI: (1) > (2) in knowledge of F+V intake PI: (1) > (2) and access to F+V at home and school	PI: $p < .001$ for F knowledge but NS for V knowledge PI: $p < .0001$
Perikkou et al. 2013, OEN (Cyprus)	General, CR	RCT	n = 184 mean age = NR (grade 3 students; co-ed)	(1) intervention group (EDUC) × 5 classes (59 students) (2) intervention group (EXPO) × 5 classes (67 students) (3) control group × 5 classes (58 students)	**Educational Material Group (EDUC)**: curriculum based on Social Cognitive Theory designed to teach about healthy lifestyle and build skills for choosing healthful foods; consists of 29 lessons of 15 minutes each, delivered by teacher once a week. (1) EDUC intervention (2) exposure group (EXPO): no educational curriculum but children were exposed to the consumption of a fruit or healthy snack by teacher (3) usual classroom activity	IL: 1 year PI: 1 year FU: 1 year	PI: (2) > (1) > (3) fruit consumption FU: (2) > (1) > (3) fruit consumption	PI: $p < .001$ FU: $p < .001$
Prelip et al., 2011, USA	Low SES (and predominately racialized minority students), CR & WS	RCT	n = 1528 mean age = NR (grades 3-5 students; co-ed)	(1) intervention school (HA) × 9 schools (1532 students) (2) control school × 3 schools (493 students)	**Hybrid Approach to Nutrition Education Programming (HA)**: teachers given the choice of using district-wide intervention strategies, choosing other existing nutrition education activities, or creating their own (1) HA intervention (2) usual classroom activities	IL: 9 months PI: 9 months	PI: teacher influence on students' F+V attitudes increased in (1) and decreased in (2) PI: (1) and (2) increase in F+V consumption	PI: $p < .05$ PI: NS

Table 2 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if available or applicable)
Tak et al., 2010, OEN (Netherlands)	General, WS	CT	n = 705 mean age = 10.1 yrs (co-ed)	(1) intervention school (DSP) × 31 schools (346 students) (2) control school × 24 schools (425 students)	**The Dutch Schoolgruiten Project (DSP)**: a primary school-based intervention that aims to improve the availability, accessibility, and exposure of F+V at school; provides children with F+V twice a week during a break (1) DSP intervention (2) usual school activities	IL: 1 year PI: 1 year FU: 1 year	FU: (1) > (2) brought F+V to school more often and fewer unhealthy snacks	FU: $p < .05$
Wall et al., 2012, USA	General, MHE	RCT	n = 1937 mean age = 9.3 yrs (grade 4 students; co-ed)	(1) intervention school (SNAP-Ed) × 57 classrooms (1047 students) (2) control school × 51 classrooms (890 students)	**Supplemental Nutrition Assistance Program Education (SNAP-Ed)**: local partners deliver nutrition education intervention; consists of 4 lessons focused on vegetables (1) SNAP-Ed intervention (2) usual school activities	IL: 3-5 weeks PI: 3-5 weeks	PI: (1) and (2) increase in vegetable preference and knowledge PI: (1) increase in vegetable attitude and self-efficacy	PI: (1) $p < .001$ and (2) NS PI: $p < .001$
Wind et al., 2008, OEN (Norway, Spain, Netherlands)	General, CR	RCT	n = 868 mean age = 10.7 yrs (co-ed)	(1) intervention school (Pro-C) × 62 schools (868 students) (2) control school × 62 schools (students NR)	**Pro-Children Study (Pro-C)**: a multicomponent intervention that included school-based education aimed at children's behavioural determinants, parental involvement, and changes in school environment; consists of 16 lessons guided by worksheets and a web-based tool (1) Pro-C intervention (2) Usual school activities	IL: 8 months PI: 8 months FU: 1 year	PI: (1) appreciated the project PI: Appreciation of the project was positively related to F+V intake	PI: $p < .001$

Table 3
School-based Interventions Targeting Physical Activity and Healthy Eating/Nutrition

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Barr-Anderson et al., 2012, USA	Low SES, WS	CT	n = 148 mean age = 11.2 yrs (grade 6 students; co-ed)	(1) intervention group (PALA+P) × 2 schools (87 students) (2) control group (standard PALA) × 2 schools (61 students)	**Presidential Active Lifestyle Award (PALA) program**: extracurricular activities program to promote PA; includes weekly activity documentation and incentives (1) enhanced PALA + peers program (PALA+P): comprised of a peer leadership component and innovative exercise resource toolkit including DVDs; consists of 6 25-minute PA DVDs, 6 peer- and teacher-led classrooms sessions, and 6 PA and healthy eating homework activity sheets (2) standard PALA program	IL: 6 weeks PI: 6 weeks	PI: (1) increase moderate PA and (2) decrease moderate PA PI: girls increase moderate and vigorous PA	PI: $p = .02$ PI: $p = .03$ (moderate) and $p = .04$ (vigorous)
Cohen et al., 2014, USA	Low SES, (and rural) WS	RCT	n = 432 mean age = 8.65 yrs (at baseline; co-ed)	(1) intervention group (CHANGE) × 8 schools (85 students) (2) control group × 8 schools (91 students)	(1) **Creating Healthy, Active and Nurturing Growing-up Environments (CHANGE)**: a community- and school-based healthy lifestyles intervention to improve rural elementary school children's' diets and physical activity levels and decrease BMI scores (2) usual school activities	IL: 2 years PI: 2 years	PI: (1) > (2) for consumption of F+V PI: (1) < (2) glycemic index of diets	PI: $p < .05$ PI: $p < .05$
Foster et al., 2008, USA	General, WS & MHE	RCT	n = 1349 mean age = 11.2 yrs (at baseline; co-ed)	(1) intervention group (CHANGE) × 8 schools (85 students) (2) control group × 8 schools (91 students	(1) **School Nutrition Policy Initiative (SNPI)**: a multicomponent school-based intervention targeting the school self-assessment, nutrition education, nutrition policy, social marketing, and parent outreach (2) usual school activities	IL: 2 years PI: 2 years	PI: (1) < (2) inactivity PI: (1) and (2) decreases in consumption of fat and F+V and decreases in physical activity	PI: $p < .01$ PI: NS
Fung et al., 2012, CAN	General, WS & MHE	other (intervention study)	n = 637 mean age = NR (grade 5)	(1) intervention group (APPLE Schools) x 10 schools (637 students) (2) control group x 150 schools (3398 students)	(1) **APPLE Schools**: a multi-component school-based intervention that relies upon a site facilitator to implement healthy eating and active living strategies (e.g., by contributing to school Health curriculum, engaging parents, offering professional development, etc.) (2) usual school activities	IL: 2 years	PI: (1) > (2) F+V consumption PI: (1) > (2) increase in PA	PI: $p < .05$ PI: $p < .05$

Table 3 (continued)

Author, Year, Country	Target Population, Intervention Type	Research Design	Sample	Intervention Groups (if applicable)	Intervention Program	Intervention, Post-intervention Evaluation, and Follow-up Duration	Notable Results	Statistical Significance (if reported or applicable)
Jago et al., 2011, USA	Low SES (and 50% or more belonging to a culturally ethnic group), MPE, MHE, CR, & WS	RCT	n = 4063 mean age = 11.3 yrs at baseline (co-ed)	(1) intervention group (HEALTHY) × 21 schools (2060 students) (2) control group × 21 schools (2003 students)	(1) **The HEALTHY Intervention**: includes four components: a) improved school food environment, b) physical activity and eating educational sessions, c) social marketing, and d) revised physical education curriculum (2) usual school activities	IL: 2.5 years PI: 2.5 years	PI: (1) and (2) increase in Met-S prevalence, increase in fitness, and decrease in MVPA	NS
Kafatos et al., 2007, OEN (Greece)	General, WS	CT	n = 176 mean age = 6.3 yrs at baseline (co-ed)	(1) intervention group (CHN) × 24 schools (85 students) (2) control group × 16 schools (91 students)	(1) **Cretan Health and Nutrition Education program (CHN)**: designed and implemented by the Preventive Medicine and Nutrition Clinic of the University of Crete and aimed to encourage healthy dietary and general lifestyle habits in primary school children (2) usual school activities	IL: 6 years PI: 6 years FU: 4 years	FU: (1) > (2) leisure time MVPA	FU: $p = .032$
Springer et al., 2013, USA	General, WS	CT	n = 511 mean age = 10 yrs (grades 4 & 5; co-ed)	(1) intervention group (MK) × 5 schools (383 students) (2) control group × 3 schools (128 students)	(1) **Marathon Kids (MK)**: a community and school-based program that promotes running, walking, and healthy eating in elementary school children (2) usual school activities	IL: 6 months PI: 6 months	PI: (1) > (2) running time	PI: $p = .002$

Notes. CR: classroom intervention, CT: controlled trial, F+V: fruit(s) and vegetable(s), FU: follow-up duration, IL: intervention length, MHE: modified health education intervention, MPE: modified physical education intervention, NR: not reported, OEN: other European nation(s), PI: post-intervention length, RCT: randomized controlled trial, WS: whole school intervention.

School-based Interventions Targeting Physical Activity

Description of interventions. Most of these physical activity interventions and research studies occurred within other European nations (n = 8), with six others occurring in the United Kingdom, four in the United States, two in Canada, and one in Australia/New Zealand. Interventions ranged from eight days to two years (mean intervention length = 7.5 months). Seven were 1-6 weeks in length, seven were 1.5-8 months in length, and seven were 0.75-2 years in length. Whole school interventions (n = 10) were most common and generally included whole school activities combined with parental/community involvement. Classroom interventions (n = 5) included those that were delivered by teachers (outside of physical and/or health education) to their students. Three interventions were done through modified physical education programs, one through modified health education programs, and two were done through combined intervention programs (e.g., modified health education interventions and classroom interventions).

Description of target populations. Of the 21 interventions, 13 targeted elementary populations (grades K-6), 4 targeted secondary populations (grades 7-12), and 4 targeted elementary and secondary populations. Moreover, 18 studies focused upon "general" populations (all but one with co-ed populations) while three focused upon low SES populations.

Description of research methodologies and results. Twenty-one of the interventions focused predominately or exclusively upon physical activity. Of these 19, 11 were controlled trials, five were randomized controlled trials, and the remaining five employed other research designs (e.g., intervention study, alternating treatments design). Moreover, of the 21 studies, 20 reported on levels of statistical significance (19 found statistically significant positive changes). The five studies employing other research designs also found promising and positive results related to various physical activity interventions (see Table 1).

School-based Interventions Targeting Healthy Eating/Nutrition

Description of interventions. Most of these healthy eating/nutrition interventions and research studies occurred within the United States (n=8), with five others occurring in other European nations, one in Australia/New Zealand, and none in the United Kingdom. Interventions ranged from five weeks to two years (mean intervention length = 11.2 months). Two were 1-6 weeks in length, four were 1.5-8 months in length, and eight were 0.75-2 years in length. Classroom interventions (n=4) were most common and generally included whole school nutrition activities to improve fruit and vegetable consumption and nutrition knowledge. There were also three modified health education interventions and three whole school interventions (as well as four combined intervention programs).

Description of target populations. Of the 14 interventions, 10 targeted elementary populations (grades K-6), three targeted secondary populations (grades 7-12), and one targeted elementary and secondary populations. Moreover, nine studies focused upon "general" populations (all with co-ed populations) and four focused upon low SES populations (one other site was at an under-resourced elementary school).

Description of research methodologies and results. Fourteen of the interventions focused predominately or exclusively upon healthy eating/nutrition. Of these 14, seven were controlled trials and seven were randomized controlled trials. Moreover, all 14 studies reported on levels of statistical significance (14 found statistically significant positive changes). The studies employing other research designs also found promising and positive results related to various physical activity interventions.

School-based Interventions Targeting Physical Activity and Healthy Eating/Nutrition

Description of interventions. Most of these physical activity and healthy eating/nutrition interventions and research studies occurred within the United States (n = 5), with one other occurring in Canada, one in other European countries, and none in the United Kingdom or Australia/New Zealand. Interventions ranged from six weeks to six years (mean intervention length = 26.0 months). One was 1-6 weeks in length, one was 1.5-8 months in length, and three were 0.75-2 years in length (one was 2.5 years and one was 6 years in length). Four of the interventions were whole school interventions while the other three relied upon multiple interventions.

Description of target populations. All seven interventions targeted elementary populations (grades K-6). Four studies focused upon "general" populations and three focused upon low SES populations.

Description of research methodologies and results. All six of the interventions focused predominately or exclusively upon multiple outcomes. Of these, three were controlled trials, three were randomized controlled trials, and one was an intervention study. Moreover, of the six studies, all reported on levels of statistical significance (five found statistically significant positive changes).

Summary

The purpose of the scoping review was to examine the extent, range, and nature of research related to school-based physical activity and healthy eating/nutrition interventions and to summarize and disseminate these research findings. Using ERIC, ProQuest, and SPORTDiscus search engines, we initially identified 1369 studies. After an extensive and rigorous review, the literature search parameters revealed a total of 42 studies for physical activity and healthy eating/nutrition. The timeframe for the interventions ranged from eight days to six years and most studies in the physical activity and healthy eating/nutrition sections were controlled or randomized controlled trial interventions. As well, the most common category of intervention was whole school (17), followed by combined interventions (9), classroom interventions (8), modified health education (5), and modified physical education (3).

Regardless of length or category, almost every study signalled positive changes (e.g., increased physical activity, improved healthy eating intentions). For example, some studies used interventions that relied upon pedometers, which involved participants garnering feedback, learning goal setting techniques, and having "coaching sessions" to assist in increasing step counts. Other whole school approaches (e.g., see Christodoulos, Douda, Polykratis, & Tokmakidis, 2006; Haerens et al., 2006; Quaresma, Palmeira, Martins, Minderico, & Sardinha, 2014) found that involving family within program interventions was successful in increasing physical activity levels and promoting positive health behaviours. Interventions involving curriculum changes within the classroom setting (e.g., see Birnbaum, Lytle, Story, Perry, & Murray, 2002; Blom-Hoffman, Kelleher, Power, & Leff, 2004; Cunningham-Sabo & Lohse, 2014; Pangrazi, Beighle, Vehige, & Vack, 2003) resulted in students being more physically active during the school day, a rise in healthy eating knowledge amongst students, as well as increases in fruit and vegetable consumption. It is also worth noting that regardless of age group (elementary, middle, or high school), all studies resulted in positive changes in levels of physical activity, behaviours and attitudes toward healthy living, and/or healthy eating. As well, targeted populations varied from regular classrooms and school populations to schools considered to be in low socio-economic areas. Further, some studies had components that were "outside" of the

classroom, such as introducing vacation activity planners, developing interactive websites, and improving the accessibility of fruits and vegetables in schools (Foster et al., 2008; Morris, Gorely, Sedgwick, Nevill, & Nevill, 2013; Tak, Te Velde, Singh, & Brug, 2010). Such whole school policy changes have been successful in changing student attitudes toward health promoting behaviours and health promoting schools (Blom-Hoffman et al., 2004; Foster et al., 2008; McConnell et al., 2014; Wind et al., 2008).

As detailed above, there were many different intervention "models." As professors of physical education working with pre-service and in-service teachers across Canada, we are most interested in the sorts of programs that our students and teachers may actually deliver, featuring either modified physical education or modified health education. As such, we have provided a brief summary of six programs. Three of these programs targeted physical activity (SPARK, Great Activity Programme, JuvenTUM) and three targeted healthy eating/nutrition (Constructivist Nutrition Education, Pro-Children Project, Educational Material Group).

- SPARK (US): The SPARK program (Sports Play and Action Recreation for Kids) was developed in 1989 at San Diego State University and originally included 31 lessons meant to be taught in weekly 30-minute sessions over one school year. The program now offers a wide array of lessons and services aligned with America's National Association for Sport and Physical Education (NASPE) National Standards. Schools or teachers who opt to implement the SPARK program may also access support from a Project Coordinator, the SPARK "curriculum," on-site teacher training, content-matched equipment, assessment and evaluation tools, and lifetime follow-up support.
- Great Activity Programme (UK): The Great Activity Programme was designed and implemented by Great Run, a sports marketing and event management company. Resources are based on other previously developed material developed in consultation with teachers and educational experts. These resources align with the National Curriculum Guidelines of the United Kingdom. Though intervention materials are largely only available online, schools and teachers benefit from regular visits from Great Run leaders.
- JuvenTUM (OEN [Germany]): In addition to some idealized school-site environmental changes, the principal intervention is made possible via a collection of 10, 45-minute lessons (meant to be delivered monthly). Each of the 10 lessons includes three parts: a 10-minute warm-up with running and playing games at high intensity, 30 minutes of exercises to improve body awareness and self-esteem, and 5 minutes of relaxation exercises. All lessons include worksheets and homework assignments to stimulate parent-child interaction and to support physical activity at home. The program also includes a parent-training session as well as a nine-hour teacher training session.
- Constructivist-Oriented Nutrition Education (US): The main intervention was meant to implement a constructivist-based approach to a nutrition education program entitled "What's Food Got to Do With It?" Teachers attended an 8-hour professional development session on constructivist approaches to learning and then implemented a series of six, one-hour lessons in their health education program for Grade 7 students. The lessons consisted of the content and benefits of food groups, eating based on food groups, analyzing influences that impact eating, selecting different foods, reading and interpreting food labels, deciphering health claims on labels, body image, and surviving fast food restaurants.

- Pro-Children Project (OEN: Norway, Spain, Netherlands): A curriculum consisting of 16 lessons guided by worksheets and a web-based computer tailored feedback tool that children are asked to complete three times during the intervention period. Four of the lessons involve homework assignments. Parents are encouraged to be involved in the project by means of homework assignments of their child. Further, parent newsletters and a parent version of the web-based computer-tailored tool are also utilized to get personalized feedback on their own fruit and vegetable intake levels.
- Educational Material Group (OEN: Cyprus): The main intervention was to use Social Cognitive Theory designed to teach about healthy lifestyles and to help build skills for choosing healthy foods. The program consists of 29 lessons, each 15 minutes in length, which are delivered by the classroom teacher once a week.

Through the detailed scoping review offered in this paper, we have identified a number of important elements for consideration in order to effect behaviour or outcome change through school-based physical activity and/or healthy eating/nutrition interventions. While there is much to be learned from these interventions that can inform future studies, it is important to recognize several common aspects that may have contributed to the success of these programs. These are related, largely, to professional development (e.g., see Cardon, Haerens, Verstraete, & de Bourdeaudhuij, 2009; Naylor et al., 2003), clear foci (e.g., see Butcher, Fairclough, Stratton, & Richardson, 2012; Duncan, Birch, & Woodfield, 2012), curriculum-alignment (e.g., see Cardon et al., 2009; Christodoulos et al., 2006), and home-life engagement (e.g., see Blom-Hoffman et al., 2004; Quaresma et al., 2014).

Evidence of these things was found in several ways and in several of the intervention programs. First, professional development sessions were provided for teachers to ensure instructional capability, content knowledge, and program familiarity. Second, these programs did not target numerous outcomes but enabled a specific focus to the intervention by using one or two outcomes per session/lesson. Third, the program interventions were linked specifically to the appropriate jurisdictional curricula (e.g., NASPE) so as to support teachers in the delivery of quality content that meets student outcomes or standards. Fourth, there was meaningful engagement of parents/guardians to ensure home support and continuity between home and school. Finally, and connected to the fourth point, there was a provision of "take home" or "homework" activities for students. This process served to embed the intervention as "part-of-school" while also informing and educating parents/guardians.

The evidence presented from the review suggests that both program and curriculum developers in their search for effective behaviour or outcome change in school-aged children and youth might consider, closely, these important elements. Perhaps, most importantly, we are hopeful that teachers can use these findings to determine the potential efficacy of proposed programs and to assist with decisions related to implementation.

A Cautionary Note

Though our review of literature did not consider the sources of these physical activity and healthy eating/nutrition programs, it is clear to us that some of them were created by for-profit companies (e.g., SPARK; Cardon et al., 2009) while others were created and/or funded by industry-led agencies (e.g., The Dutch Schoolgruiten Project; Tak et al., 2010). While such for-profit or industry influence, alone, should not discount the potential value of these initiatives, interventions, or programs, these agencies' status and interests do demand more focused attention and consideration (i.e., more than we have given herein). That is, their role and influence in the

creeping corporatization of school physical and health education is deserving of critique and challenge, something we and others have suggested before (e.g., Powell, 2014; Robinson, Gleddie, & Schaefer, 2016). Additionally, some have suggested that caution is similarly in order when welcoming medical professionals into public schooling spaces (e.g., Gard & Pluim, 2014). That is, unrestricted influence from educational "outsiders" risks the introduction of dissonant perspectives and discourses—resulting in, for example, content failing to be curriculum-aligned or educational system-supported.

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