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Principals' involvement in comprehensive school physical activity programmes: A social-ecological perspective

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Abstract

To support school physical education, United States (US) national organizations in medicine, health, and education recommend that schools adopt comprehensive school physical activity programmes (CSPAPs). An important factor in successful CSPAP implementation is the involvement of the school principal. The purpose of this study was to examine relationships between principals' self-reported CSPAP involvement and their social-ecological-based perceptions about CSPAPs. We analysed survey responses from a national sample of principals in the US who indicated their school had a CSPAP ($n = 198$). Exploratory structural equation modelling supported a single-factor solution for CSPAP involvement (12 items) and three social-ecological factors, which we labelled 'intrapersonal' (nine items mainly focused on expected outcomes of CSPAPs), 'interpersonal' (five items focused on parents' and teachers' support of the CSPAP), and 'environmental' (12 items focused on the support of the overall school environment, the community surrounding the school, and public policy for the CSPAP). Path analysis showed involvement factor scores are predicted by intrapersonal factor scores, which, in turn, are predicted by interpersonal and environmental factor scores. The results of this study are helpful in identifying targets for future research and practice related to CSPAP implementation and can inform efforts to prepare and support principals with respect to their CSPAP involvement.

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Introduction

In the United States (US), the Physical Activity (PA) Guidelines for Americans (US Department of Health and Human Services (USDHHS), 2018) recommend that children and adolescents ages 6–17 should accumulate at least 60 minutes of mostly moderate-to-vigorous PA each day, as this can lead to health benefits such as healthy bones and muscles, improved muscular strength and endurance, reduced development of chronic disease risk factors, improved self-esteem, and reduced stress and anxiety (Physical Activity Guidelines Advisory Committee, 2018). Unfortunately, approximately three quarters of children and adolescents in the US are not meeting this benchmark for daily PA participation (National Physical Activity Plan Alliance, 2018). Moreover, children spend 80–93% of their waking hours in sedentary time (Turner et al., 2014) and it is estimated that the majority of school-aged youth are not meeting national content standards in physical education (Hastie, 2017). National organizations (e.g. Centers for Disease Control and Prevention (CDC), 2011; Institute of Medicine (IOM), 2013 (now named the National Academy of Medicine); Society of Health and Physical Educators (SHAPE) America, 2015) suggest that schools should be a key focus of intervention efforts when attempting to increase and promote youth PA engagement. Schools have access to nearly all youth in the US and school-based PA not only can improve students' health but also enhance their academic performance (IOM, 2013). Furthermore, education settings can play a major role in public health initiatives related to PA, given that schools directly reach approximately 25% of the US population (National Physical Activity Plan Alliance, 2016).

Comprehensive school physical activity programmes

In 2008, the National Association for Sport and Physical Education (NASPE) (formerly an association of the American Alliance for Health, Physical Education, Recreation and Dance (AAHPERD), and now encompassed within SHAPE America) published a position statement (NASPE, 2008), which was updated in 2015 (SHAPE America, 2015) called 'Comprehensive School Physical Activity Programs' (CSPAPs). A CSPAP is described as a multicomponent approach to enhancing physical education and promoting increased PA among school communities. The components of a CSPAP can include (a) physical education, (b) PA before and after school, (c) PA during school, (d) staff involvement, and (e) family and community engagement (SHAPE America, 2015). However, given limited descriptive research on CSPAPs, recent literature reflects a broader conceptualization of a CSPAP, which focuses less on the total number of programme components and more on whether a school, through multiple possible approaches, provides all students with sufficient opportunities to meet the programme goals (Webster et al., 2020b, 2020c, 2020d). Implementing a CSPAP is intended to provide children and adolescents with PA support and opportunities before, during, and after school as a means to '[developing] physically educated students who are physically active for the nationally recommended 60-plus minutes each day and who develop the knowledge, skills and confidence to be physically active for a lifetime' (SHAPE America, 2015: 3).

A survey conducted by AAHPERD in 2011 found that CSPAPs existed in only 16% of elementary schools, 13% of middle schools, and 6% of high schools. In 2013, the IOM endorsed a multi-component, or 'whole-of-school', approach to youth PA promotion (IOM, 2013: 30) and the CDC partnered with SHAPE America to develop a step-by-step guide for implementing a CSPAP (CDC, 2013). However, based on a recent survey by the CDC (Brener et al., 2017), a mere 3% of secondary schools have implemented a CSPAP. Thus, while CSPAPs are recommended to increase students' daily PA and support the educational goals of physical education (SHAPE America, 2015), and the CDC has adopted the CSPAP framework as the national framework for physical education and PA in the US (CDC, 2019), the apparent continued low prevalence of CSPAPs in the US underscores the need to investigate the factors that are associated with programme implementation.

Principals' involvement in CSPAPs

One factor that has consistently been cited as critical in school reform efforts and in creating and maintaining an effective school is the principal (also referred to as the head teacher, headmaster/headmistress, school director, and other titles in various contexts) and their involvement (Dow and Oakley, 1992; Fullan, 2016). As a figurehead of school leadership, the principal is a key driver in the school's mission, vision, and culture (Bryk et al., 2010; Leithwood and Jantzi, 1999). A principal's involvement in a school programme, for example by actively assisting in its development and taking part in its promotion, can lead to teachers feeling they are supported and showing increased commitment to the programme (Leithwood and Jantzi, 1999). The principal is the main reason programmes are or are not successful in schools; they hold the most influence for implementation of programmes and policies (Datnow and Castellano, 2001).

Carson et al. (2014) proposed that support from administrators, such as the principal, is necessary to the successful implementation of a CSPAP. However, the concept of 'support' may not fully encompass the range of ways in which a principal might be involved with a CSPAP. According to Webster et al. (2020e: 130), 'Staff involvement with promoting PA can be broadly conceptualized in terms of the direct and indirect actions staff members take to increase the concomitant or future amount of PA in which youth engage'. A recent scoping review (Webster et al., 2020a) identified three themes in the published recommendations for school administrators' involvement in school-based health promotion. These themes included collaboration (e.g. using a distributive leadership style, being involved with defining health issues, identifying solutions, and monitoring progress), advocacy (e.g. knowing about and valuing health promotion, and educating policymakers about the importance of school health promotion), and support (e.g. providing resources for teachers, visiting teachers' classrooms, and offering feedback). Yet, a descriptive research base to inform the specific actions school principals might take to be involved with a CSPAP is lacking.

A social-ecological perspective of principals' CSPAP involvement

In addition to the limited research available to operationally define principals' CSPAP involvement, little is known about variables that may influence principals' involvement with CSPAPs. Van den Berg et al. (2017) found that principals perceived PA to have academic, physical, and social-emotional benefits but also perceived barriers to implementing PA that were related to time limitations, school priorities, space constraints, and financial challenges. A gap that remains in the literature, however, is research on principals' perceptions specifically pertaining to CSPAPs. It is important to investigate these perceptions, particularly to understand how they may be related to

principals' CSPAP involvement. In the present study, we adopted a social-ecological perspective to investigate principals' perceptions of CSPAPs and how these perceptions relate to principals' CSPAP involvement.

Based on the work of Bronfenbrenner (1976, 1977), a social-ecological perspective of human behaviour considers the influence of a wide range of variables on targeted behaviours of interest. Social-ecological models are used to organize these variables into multiple levels of influence and illustrate relationships among individuals, groups, and their environments (Golden et al., 2015; McLeroy et al., 1988; Sallis et al., 2006, 2008; Stokols, 1996). Numerous examples of social-ecological models exist in theory and research specific to school-based PA promotion (e.g. Carson et al., 2014; Langille and Rodgers, 2010; Webster and Suzuki, 2014; Webster et al., 2013). In general, these models encompass five levels of influence: (a) intrapersonal, (b) interpersonal, (c) organizational, (d) community, and (e) public policy. Intrapersonal variables may include beliefs (e.g. self-efficacy in implementing an educational programme, expected outcomes of implementing the programme), attitudes, and other psychological attributes (e.g. motivation to implement a new programme) of the individual whose behaviour is being targeted (e.g. school principal). Variables at the interpersonal level tend to focus on relationships between the individual and others with whom the individual interacts (e.g. other administrators, teachers, students, parents, community stakeholders). The organizational level of influence is usually comprised of variables that reflect institutional resources (e.g. school facilities, available educational materials), norms (e.g. cultural customs commonly followed by students and staff, a school honour code), practices (e.g. allocated curriculum time for different school subjects, instructional approaches used by teachers), and policies (e.g. expectations for student conduct, whether or not teachers are allowed to withhold recess as a punishment). At the community level, variables often centre on factors, such as the support of other organizations (e.g. a facility joint-use agreement between the school and a local YMCA), which surround the individual's own organization. Public policy variables may include the presence of any local, state, or federal policies that are pertinent to the targeted behaviour (e.g. a state policy that requires schools to provide students with a certain number of minutes of PA each week). In the context of a CSPAP, a social-ecological perspective can help to identify key variables that should be the focus of interventions and professional learning directed towards influencing the PA promotion efforts of programme implementors. Previous social-ecological research in the area of school-based PA promotion has not conceptualized or investigated the intrapersonal, interpersonal, organizational, community, or public policy variables that may influence school principals' CSPAP involvement.

Purpose of the study

Overall, although considerable research exists on the staff involvement component of the CSPAP framework, particularly in regard to classroom teachers and afterschool programme staff, there is currently an absence of research on principals' involvement in CSPAPs (Webster et al., 2020e). The purpose of this study was to examine relationships between principals' CSPAP involvement and their perceptions about CSPAPs from a social-ecological perspective. In accordance with social-ecological theory and research related to school PA promotion (Carson et al., 2014; Langille and Rodgers, 2010; Webster et al., 2013; Webster and Suzuki, 2014), we hypothesized that intrapersonal variables would have the strongest and most direct association with the targeted behaviour (i.e. principals' CSPAP involvement), while variables at each subsequent level (interpersonal, organizational, community, and public policy, respectively) would have an indirect and

increasingly weaker association. The results of this study will help to advance research focused on the role of principals in CSPAP implementation and may inform future directions in CSPAP planning and professional development for school administrators.

Methods

Instrumentation

We developed an online survey to investigate principals' involvement in CSPAPs. The survey encompassed a range of variables hypothesized to be associated with principals' CSPAP involvement from two distinct theoretical perspectives (social ecology theory and social learning theory). The present investigation, which focuses on social-ecological variables and their relationship to principals' CSPAP involvement, is the first study using data from the survey. The final version of the survey, specifically the parts of the survey used in the present study and as administered to the main study sample, is described in this section. The development of the survey is described in the Procedures section that follows. All phases of survey development and administration were facilitated via Survey Monkey.

The survey was organized into seven sections: (a) informed consent, (b) introduction, (c) CSPAP implementation, (d) CSPAP involvement, (e) social-ecological factors, (f) professional/context biography, and (g) participant demographics. The first page of the survey was an informed consent form. Subsequently, in the introduction section, participants were provided with an overview of the CSPAP framework and the purpose of the survey. The CSPAP implementation section of the survey listed possible CSPAP components (e.g. physical education, PA during school, PA before and after school) with examples and included a single dichotomous response question ('yes/no') asking participants if their school has a CSPAP. A CSPAP was conceptualized as follows, based on the recent work by Webster et al. (2020a, 2020b, 2020c):

> [your school provides] *OPPORTUNITIES, through any combination or variety of CSPAP components* – for all students at your school to: (a) receive standards-based physical education experiences designed to prepare individuals for a lifetime of participation in physical activity, and (b) meet the national guideline for school-aged youth to accumulate at least 60 minutes of mostly moderate-to-vigorous physical activity each day (including lunch time activities, and before and after school activities).

A logic mechanism was built into the survey so that 'yes' respondents proceeded to the subsequent two sections (involvement and social-ecological factors) with items written in the past/present tense (e.g. 'I am involved with supporting my school staff in their efforts to promote physical activity'). 'No' respondents proceeded to two identical sections except that items were written in the future tense (e.g. 'I would be involved with supporting my school staff in their efforts to promote physical activity'). The final two sections on professional context/biography and participant demographics focused on the PA promotion strategies, within each CSPAP component, currently used at participants' schools, as well as participants' school context (e.g. geographic location, total student enrolment), educational background (e.g. highest degree earned, licensure obtained), professional experience (e.g. years serving as a principal, years serving as a teacher), age, gender, and race/ethnicity. Items focusing on PA promotion strategies within each CSPAP component were based on recommended strategies from SHAPE America (2015) and the CDC (2019).

In all, 80 items from the final survey were used for this study. This item count is based on having counted equivalent items for 'yes' and 'no' respondents as single items. One item was included to assess CSPAP implementation; 12 items were included to assess the dependent variable (principal involvement in a CSPAP); 52 items were included to assess social-ecological variables at five levels of influence, including intrapersonal (29 items), interpersonal (five items), organizational (nine items), community (five items), and public policy (four items); 12 items were included to assess professional context/biography; and three items were included to assess participant demographics.

Procedures

Phase 1: item construction, scale development, and participant instructions. To construct an initial set of items for the survey, we completed a comprehensive literature search to find published records (e.g. peer-reviewed articles, books, doctoral dissertations, public policies) in the areas of CSPAP (e.g. Carson et al., 2014; Rink et al., 2010; SHAPE America, 2015), principals' perceptions of health-related school programming (e.g. physical education, recess, fitness, wellness) (e.g. Davis, 2012; Greaney et al., 2007; Morrison, 2006; Van den Berg et al., 2017; Weiler et al., 2003), and social-ecological theory and research (e.g. Golden et al., 2015; McLeroy et al., 1988; Sallis et al., 2008; Webster and Suzuki, 2014). We developed a six-point Likert-type response scale (see the Instrumentation section) for the items based on recommendations for scale development (Fink, 2003; Johnson and Morgan, 2016; Krosnick and Fabrigar, 1997) and the treatment of categorical variables (Finney and DiStefano, 2006). Based on recent literature, including research on physical education teachers' perceptions related to CSPAPs (Webster et al., 2020b, 2020c) and conceptual work intended to advance CSPAP research and practice (Webster et al., 2020d), we incorporated instructions for participants along with a definition and examples of a CSPAP (see Instrumentation section).

Phase 2: pilot testing. Before data collection started, we obtained approval from the first author's university institutional review board (IRB) to conduct the study. There were two rounds of pilot testing. The purpose of the first round of pilot testing was to enhance the content validity of the survey and obtain feedback about the length, formatting, and clarity of the survey. The purpose of the second round of pilot testing was to obtain feedback about the survey from a convenience sample of principals and to conduct a preliminary assessment of the survey's psychometric properties.

For the first round, we emailed the survey to CSPAP authors ($n = 41$), authors who have published research using social-ecological theory ($n = 51$), and university faculty in the area of educational leadership ($n = 89$). We identified CSPAP authors from an edited book about CSPAP research and practice (Carson and Webster, 2020). For each section of the survey, we instructed participants to rate the appropriateness of the items (completely inappropriate, mostly inappropriate, somewhat inappropriate, mostly appropriate, and completely appropriate) and provide feedback about the content on each page. A total of 24 CSPAP authors (59% response rate) provided responses. Using their ratings and comments, 24 items were removed (15 items intended to measure intrapersonal variables, seven items intended to measure interpersonal variables, and two items intended to measure organizational variables). Additionally, several minor revisions were made: the term 'CSPAP' was replaced with 'physical activity opportunities' and 'physical activity programming' in two of the items on the involvement scale, negatively worded items

(e.g. 'A CSPAP would lead to a chaotic school environment') were either deleted or revised as positively worded items, and items that included the term 'parents' were changed to read 'parents/guardians'.

To identify authors in the area of social-ecological theory, we located published articles online (e.g. Golden et al., 2015; McLeroy et al., 1988; Sallis et al., 2008). We found email addresses for 51 authors and emailed the authors with instructions to match each of the social-ecological items on the survey to its respective level of influence (intrapersonal, interpersonal, community, organizational, or public policy). We also asked the authors to provide feedback on the quality and appropriateness of specific items and/or the items in general. A total of six authors provided responses (12% response rate). Based on their feedback, items were found to match their intended social-ecological levels, so no changes were made to the survey.

We compiled a list of 89 university faculty, representing 58 US institutions, who work in the area of educational leadership and policy. These individuals encompassed all levels of academic rank/seniority from assistant professor to retired professor, and many of the faculty had served as former school- and district-level administrators. For each section of the survey, participants were instructed to rate the appropriateness of the items (completely inappropriate, mostly inappropriate, somewhat inappropriate, mostly appropriate, and completely appropriate), considering the roles and responsibilities of a school principal, and provide feedback about the content on each page. A total of 16 educational leadership faculty provided responses (18% response rate), which informed several changes to the survey. Specifically, two items were removed ('Others in my school environment notice/would notice the impact of promoting physical activity' and 'I have a good relationship with the teachers at my school'). Educational leadership faculty believed the principals would have low efficacy in judging the first item, and felt the second item was 'leading' and that principals would not admit to having a bad relationship with their staff. Also, the introduction to the survey was revised to use less academic jargon.

After making revisions to the survey based on the first round of pilot testing, we sent the survey to a convenience sample of principals ($n = 42$) from elementary, middle, and high schools and asked them to complete the survey, as well as to provide general feedback. Twenty-one principals responded (16 indicated they had a CSPAP at their school) for a 50% response rate. Using the data from this second round of pilot testing, we employed Bayesian exploratory factor analysis (EFA) to individually examine each survey scale. This served as a preliminary statistical analysis to identify any additional items for potential removal from the final survey to be used with the main study sample. Previous research showed that EFA can provide accurate results with samples as small as 20 or 10 observations when the data are well conditioned (i.e. high œ, low f, high p) (de Winter et al., 2009; Preacher and MacCallum, 2002). Further, the Bayesian estimation method does not rely on a large-sample theory, and therefore can provide accurate results with small samples, such as our convenience sample of principals (Heerwegh, 2014; Muthén and Asparouhov, 2012). Items with non-significant factor loadings were only removed for subsequent data collection in the main study if the loadings were below 0.320 or if removing the items created convergence problems. In all, five items were removed based on the results of the EFA. Additionally, in accordance with respondents' feedback about the survey, we revised the CSPAP implementation section of the survey for brevity.

We also asked the respondents from the convenience sample to retake the survey one week after their survey closed, to assess test–retest reliability. A one-week time limit was provided for them to retake the survey. There were 13 respondents (11 indicated they had a CSPAP at their school) for a

62% response rate. Thirteen items were removed from the survey due to having a Kappa value lower than 0.2.

Phase 3: main study. The administration of our survey to the main study sample occurred in the spring of 2019. Using information available on a federal website listing all public schools in the US, we applied stratified random sampling to select 60 schools (20 elementary, 20 middle/junior high, and 20 high) from each state (total of 3000 schools). Next, we visited the schools' websites to find email addresses (where available) for principals and compiled a list of 2941 email addresses. With these addresses, we sent a blanket email briefly describing the study and inviting recipients to complete the survey. The link to the survey was included in the email. Respondents for the main study were 291 principals. For the purposes of this study, we only analysed data from participants who indicated their school has a CSPAP ($n = 198$).

Data analysis for the main study

Before conducting statistical analyses, we screened survey variables to examine the prevalence of 'don't know' responses as well as the distribution of missing values. Missing responses represented approximately 1.9% of the data. The 'don't know' response option was included to prevent item non-response, forced responses, or guessing, but was not included in statistical analysis because it indicates insufficient information to provide an informed opinion. To avoid losing data, we recorded 'don't know' responses as missing values. Cases with more than 15% invalid responses were listwise deleted. The resulting proportion of values that were missing or recoded as missing ranged between 0.0% and 2.7% per item and represented approximately 2.3% of the data. Little's Missing Completely at Random (MCAR) test showed that these values were distributed completely at random ($\chi^2_{(1825)} = 1800.867$, $p = .652$); therefore, we imputed them using the expectation-maximization algorithm. The resulting sample included 198 respondents. We computed the mean and standard deviation for all survey items to examine the distribution of survey responses and identify the items with the highest ratings.

Exploratory structural equation modelling. Although social-ecological research exists in the area of school PA promotion (e.g. Langille and Rodgers, 2010; Webster and Suzuki, 2014; Webster et al., 2013), researchers in previous studies have not examined principals' CSPAP involvement from a social-ecological perspective. Since we developed the survey for our research and had not previously examined the factor structure of the final survey, the initial step of our investigation with the main study sample was to identify the latent variables underlying the data. We used exploratory structural equation modelling (ESEM) for this purpose because it allows the estimation of an exploratory factor model with rotations and estimation of cross-loadings, thus yielding a more realistic representation of the data and reducing estimation bias, while also allowing the computation of goodness-of-fit indices (Marsh et al., 2014; Morin and Maiano, 2011; Morin et al., 2013).

A group of 51 observed indicators was used to estimate latent variables. Our study met the recommendation of 3:1–6:1 observations per variable (Cattell, 1978; de Winter et al., 2009). Studies have shown that sample sizes as low as 50 or even 20 may be suitable for factor analysis when the factor loadings are high, the number of factors is low, and the number of observed variables is high (de Winter et al., 2009; MacCallum et al., 2001; Marsh et al., 1998). We used the mean and variance adjusted weighted least squares (WLSMV) estimation method and geomin rotation with the M*plus* 8.2 software. This estimation method is recommended for small sample

sizes and data that are ordinal or non-normally distributed (Finney and DiStefano, 2006). The geomin rotation is an oblique procedure; oblique rotation methods are employed when factors are expected to correlate (Browne, 2001).

The optimal number of factors was determined after examining the scree plot, the number of eigenvalues larger than one, the interpretability of the factor structure, and goodness-of-fit indices. The indices used to assess model fit were: (a) χ^2 and corresponding p-value, (b) χ^2/df, (c) the root mean square error of approximation (RMSEA) and 90% confidence interval (CI), (d) the comparative fit index (CFI), (e) the Tucker–Lewis index (TLI), and (f) the weighted root mean residual (WRMR). We sequentially removed cross-loading items and items with loadings lower than .320 (Costello and Osborne, 2005). When an optimal solution was identified, we estimated the internal consistency of each factor using the Cronbach's alpha coefficient.

Path analysis. Following the identification of the factors underlying the data, we computed factor scores, which show the location of each individual on the identified factors (DiStefano et al., 2009). Relationships between factor scores were then examined using path analysis. Relationships in the path model were based on theoretical considerations and results from previous studies (Langille and Rodgers, 2010; Webster and Suzuki, 2014; Webster et al., 2013), as well as on specified scores on social-ecological factors as predictors of factor scores measuring principals' CSPAP involvement. The indices used to assess model fit were: (a) χ^2 and corresponding p-value; (b) χ^2/df; (c) the RMSEA and 90% CI; (d) the CFI; (e) the TLI; and (f) the standardized root mean square residual (SRMR).

Results of the main study

Participant demographic and professional context/biographical information

The demographic and professional context/biographical information for participants in the main study is presented in Table 1. Table 1 displays participants' self-reported age band, gender identification, race, education level, years of experience working as a principal, and grade level, as well as participants' self-reported school context information including total student enrolment, number of students participating in free or reduced cost school lunch (a proxy for socioeconomic status), school setting, and the region of the US where they are located. Overall, the percentages in each of these categories were similar for principals who indicated their school has a CSPAP compared to principals who indicated their school does not have a CSPAP. Table 2 displays the PA promotion strategies, by CSPAP component, that the principals identified as being used at their schools. These data clearly demonstrate that, based on principals' self-reports, schools with a CSPAP are using more PA promotion strategies across all CSPAP components than schools without a CSPAP.

Factor structure

Initial exploratory analyses yielded six eigenvalues larger than one, while the scree plot indicated solutions with 3–5 factors as optimal. We estimated models with 3–5 factors. Although the five-factor solution had the best fit to the data, the fifth factor included only three items and all of them were cross-loading. Based on goodness-of-fit indices ($\chi^2_{(557)} = 123.452$, $p < .001$, $\chi^2/df = 0.221$, RMSEA (90% CI) = 0.079 (0.073–0.085), CFI = 0.947, TLI = 0.933, WRMR = 0.950) and the interpretability of the factors, we considered the four-factor solution optimal (Table 3). The χ^2 test

Table 1. Participants' self-reported demographics and school contexts for the main study.

		Participants who responded 'no' to their school having a CSPAP ($n = 36$)	Participants who responded 'yes' to their school having a CSPAP ($n = 147$)
Age band	31–35	8%	1%
	36–40	25%	12%
	41–45	22%	20%
	46–50	11%	23%
	51–55	11%	14%
	56–60	17%	18%
	60+	6%	12%
Gender identification	Male	56%	58%
	Female	44%	42%
Race	Asian	0%	2%
	African American or Black	8%	12%
	Hispanic or Latino	6%	3%
	White	86%	82%
	No response	0%	1%
Education	Masters	30%	25%
	Masters +30	42%	44%
	Ed.D.	17%	24%
	Ph.D.	11%	7%
Years of experience working as a principal	0–5	31%	28%
	6–10	31%	21%
	11–15	8%	28%
	16–20	11%	11%
	Over 20	19%	12%
Grade level	Elementary	19%	32%
	Jr. high / middle school	42%	29%
	High school	19%	26%
	Grades K–8	6%	5%
	Grades 7–12	14%	8%
Total student enrolment	$\leq$ 400	36%	27%
	401–600	31%	27%
	601–800	19%	24%
	801–1000	8%	8%
	1001–1200	3%	4%
	$\geq$ 1201	3%	10%
Percentage of students participating in free or reduced cost lunch	0–20%	3%	16%
	20–40%	14%	18%
	40–60%	36%	24%
	60–80%	14%	15%
	80–100%	33%	27%
School setting	Metro urban	28%	17%
	Suburban	25%	47%

(continued)

Table 1. (continued)

		Participants who responded 'no' to their school having a CSPAP ($n = 36$)	Participants who responded 'yes' to their school having a CSPAP ($n = 147$)
	Rural	47%	36%
Region of US where employed	Far West	3%	10%
	Great Lakes	3%	12%
	Midsouth	17%	19%
	Midwest	13%	11%
	Mountain West	25%	11%
	New England	3%	9%
	Northeast	6%	6%
	Northwest	7%	3%
	South Central	6%	6%
	Southeast	17%	13%

Note: the sample sizes represented in this table are smaller than the total number of respondents because not all respondents provided demographic/school context information.
CSPAP: comprehensive school physical activity programme.

is an overall measure of model fit; a non-significant χ^2 statistic indicates good fit (Barrett, 2007); however, this statistic is sensitive to sample size and model size. Therefore, the χ^2/df is often used, where values lower than 3 show good model fit (Finney and DiStefano, 2006). For RMSEA, values larger than .10 show poor model fit, values between .08 and .10 indicate acceptable fit, values between .05 and .08 indicate good fit, and values lower than .05 indicate excellent fit (Hu and Bentler, 1999). CFI and TLI values above .95 indicate excellent model fit, while values larger than .90 indicate good fit. WRMR values lower than 1 indicate very good fit (DiStefano et al., 2018; Yu and Muthén, 2002). All items in the four-factor solution had statistically significant loadings, above the cutoff of .320 (Costello and Osborne, 2005). Items with lower loadings and items that were cross-loading were sequentially removed; the final solution retained 39 items.

Table 4 lists the items included in each factor along with their means, standard deviations, factor loadings, standard errors, corresponding *t* statistics and *p* values. Descriptive analyses showed that most respondents provided high ratings on the majority of the survey items. The item with the highest average response was 'A CSPAP enhances students' physical development' ($M = 5.31$, $SD = .755$), followed by the item 'A CSPAP promotes students' social development' ($M = 5.24$, $SD = .748$). The item with the lowest average was 'I am involved with setting performance standards for my school's CSPAP' ($M = 3.47$, $SD = 1.316$). The strongest factor was labelled F1 ('Involvement') and included 13 items referring to CSPAP involvement. Item loadings ranged between .463 and .851, and the item with the highest loading was 'I am involved with CSPAP planning at my school'. Cronbach's alpha index of internal consistency for this factor was .900. The second factor, F2 ('Intrapersonal'), included nine items mostly referring to beliefs about the outcomes of a CSPAP. Item loadings ranged between .578 and .914 and the item with the highest loading was 'A CSPAP promotes a whole-child learning approach'. Cronbach's alpha index of internal consistency for this factor was .898. The third factor, F3 ('Interpersonal'), included five items, which referred to personnel within the school community and their support of a CSPAP.

Table 2. Physical activity promotion strategies by CSPAP component as perceived by respondents in the main study.

		Participants who responded 'no' to their school having a CSPAP ($n = 37$)	Participants who responded 'yes' to their school having a CSPAP ($n = 148$)
Physical education	Standards-based instruction	49%	78%
	Assessment of student learning	30%	55%
	Opportunities to learn	30%	50%
	Opportunities for moderate-to-vigorous physical activity	38%	60%
	Meaningful content	43%	42%
	None	24%	4%
Physical activity during school	Classroom-based physical activity	51%	74%
	Recess	43%	55%
	Physical activity assemblies	3%	23%
	Physical activity drop-in opportunities (e.g. keeping the gym open during lunch)	24%	35%
	None	19%	7%
	Don't know	3%	3%
Physical activity before/after school	Active transportation programmes/options	19%	20%
	Intramurals	16%	38%
	Interscholastic sports	57%	49%
	Physical activity clubs	30%	52%
	None	24%	11%
	Don't know	0%	3%
Staff involvement	Staff wellness programming (e.g. fitness programmes/events for teachers, health screening for teachers)	46%	62%
	Staff training for physical activity promotion	5%	18%
	Administrators involved in promoting physical activity	19%	36%
	Classroom teachers involved in promoting physical activity	24%	57%
	None	32%	14%
	Don't know	3%	3%
Family and community engagement	Facility joint-use agreements with outside organizations	19%	43%
	Physical activity programmes/events for families	8%	27%
	Parents/guardians involved in physical activity promotion	8%	18%
	Community members/organizations (e.g. universities, YMCAs, church groups) involved in physical activity promotion	8%	37%
	Active homework for students	3%	7%
	None	57%	21%
	Don't know	8%	9%

Note: the sample sizes represented in this table are smaller than the total number of respondents because not all respondents provided physical activity promotion strategies used at their school. Percentages for each component do not add up to 100% because participants were asked to select all applicable response options.
CSPAP: comprehensive school physical activity programme.

Table 3. Goodness-of-fit indices for estimated models.

Fit index	Three-factor model	Four-factor model	Five-factor model
χ^2	1806	123.452	995.142
df	592	557	523
p-value	0.000	0.000	0.000
χ^2 /df	3.051	0.221	1.903
RMSEA (90% CI)	0.102 (0.096–0.107)	0.079 (0.073–0.085)	0.068 (0.061–0.074)
CFI	0.906	0.947	0.963
TLI	0.888	0.933	0.951
WRMR	1.342	0.950	0.772

RMSEA: root mean square error of approximation; CFI: comparative fit index; TLI: Tucker–Lewis index; WRMR: weighted root mean residual.

Loadings on this factor ranged between .513 and .869 and the item with the highest loading was 'Parents/guardians at my school are interested and willing to help our school toward our CSPAP goals'. The internal consistency of this factor was alpha = .842. The fourth factor, F4 ('Environmental'), included 12 items referring to organizational, community, and public policy variables that may facilitate CSPAP implementation. Loadings on this factor ranged between .322 and .862, and the item with the highest loading was 'Policies in my school support physical activity'. The internal consistency of this factor was alpha = .840. As indicated in Table 5, all factor covariances were statistically significant. The strongest relationships were F2–F1 and F2–F4, whereas the weakest relationships were F3–F1 and F4–F1.

Path model

The estimated path model specified: (a) F4 factor scores as predictors of F3 factor scores; (b) F3 factors scores as predictors of F2 factor scores; and (c) F2 factor scores as predictors of F1 factor scores (Figure 1). This model had an overall good fit to the data ($\chi^2_{(3)} = 7.031$, $p = .071$, $\chi^2/df = 2.344$, RMSEA (90% CI) = 0.082 (0.000–0.164), CFI = 0.982, TLI = 0,964, SRMR = 0.040) and all path coefficients were statistically significant. The strongest relationship in the model was F3–>F2 (estimate = 0.610, S.E. = 0.045, estimate/S.E. = 13.693, $p < .001$), followed by F2–>F1 (estimate = 0.467, S.E. = 0.056, estimate/S.E. = 8.392, $p < .001$), and F4–>F3 (estimate = 0.402, S.E. = 0.031, estimate/S.E. = 12.894, $p < .001$). The indirect effect of F3 and F4 factor scores on F1 factor scores were, therefore, .285 and .114, respectively.

Discussion

Principals are a key part of the administrative support that is viewed as essential to the successful implementation of CSPAPs (Carson et al., 2014). Using a social-ecological framework, this study's purpose was to examine relationships between principals' self-reported CSPAP involvement and their perceptions about CSPAPs. As this was the first study to investigate these variables, a discussion of the descriptive data from the survey and the psychometric properties of our measures is warranted before addressing the main results.

Table 4. Descriptive statistics and factor loadings.

Item	M	SD	Estimate	S.E.	Estimate/ S.E.	Two-tailed *p*-value
F1 (Involvement)						
I am involved with CSPAP planning at my school	4.59	1.215	0.851	0.034	24.744	0.000
I am involved with evaluating my school's CSPAP	4.60	1.208	0.751	0.043	17.279	0.000
I am involved with providing CSPAP professional development opportunities at my school	3.86	1.431	0.733	0.048	15.311	0.000
I am involved with establishing physical activity opportunities at my school	5.00	1.013	0.707	0.043	16.598	0.000
I am involved with setting performance standards for my school's CSPAP	3.47	1.316	0.705	0.049	14.453	0.000
I am involved with allocating resources for our school's CSPAP	5.04	1.059	0.703	0.042	16.660	0.000
I am involved with serving on my school's CSPAP committee or other related (e.g. school wellness) board/task force	3.83	1.581	0.645	0.050	12.846	0.000
I am involved with building/maintaining partnerships with community constituents to implement/ sustain our school's CSPAP	4.12	1.312	0.619	0.048	12.958	0.000
I am involved with organizing physical activity opportunities at my school	4.39	1.160	0.609	0.052	11.778	0.000
I am involved with staying up-to-date on best practices for school physical activity programming	4.03	1.160	0.602	0.057	10.499	0.000
I am involved with advocating for our school's CSPAP	4.76	1.086	0.556	0.044	12.547	0.000
I am involved with being a physically active role model for others in my school	4.56	1.160	0.463	0.054	8.511	0.000
F2 (Intrapersonal)						
A CSPAP promotes a whole-child learning approach	5.23	.772	0.914	0.021	47.608	0.000
A CSPAP facilitates student learning	5.21	.778	0.912	0.019	52.276	0.000
A CSPAP enhances students' physical development	5.31	.755	0.874	0.028	31.184	0.000
A CSPAP promotes students' social development	5.24	.748	0.863	0.039	21.967	0.000
A CSPAP is the ideal programme for our students to pursue a healthy lifestyle	5.21	.769	0.820	0.040	20.636	0.000
A CSPAP improves cognitive performance	5.06	.707	0.815	0.057	14.390	0.000
A CSPAP fosters students' attention to academics	5.02	.878	0.803	0.037	21.470	0.000
A CSPAP promotes increased school attendance	4.64	.928	0.610	0.064	9.605	0.000
A CSPAP helps our students pursue physically active lifestyles	5.14	.724	0.578	0.051	11.391	0.000
F3 (Interpersonal)						
Parents/guardians at my school are interested in and willing to help our school towards our CSPAP goals	4.08	1.094	0.869	0.032	26.803	0.000
Classroom teachers at my school are able to integrate physical activity into academic instruction/learning	4.32	1.111	0.789	0.032	25.032	0.000
The majority of teachers at my school are capable of contributing to developing and implementing a CSPAP	4.36	1.002	0.711	0.037	19.361	0.000

(continued)

Table 4. (continued)

Item	M	SD	Estimate	S.E.	Estimate/ S.E.	Two-tailed *p*-value
Parents/guardians are engaged in helping our school work towards our CSPAP goals	3.82	1.137	0.686	0.038	18.133	0.000
Parents/guardians at my school support our CSPAP	4.71	.863	0.513	0.043	11.876	0.000
F4 (Environmental)						
Policies in my school support physical activity	5.14	.658	0.862	0.034	25.206	0.000
Policies in my state support school physical activity	5.01	.740	0.843	0.039	21.651	0.000
My school has sufficient funds to support a CSPAP	4.31	1.109	0.747	0.049	15.335	0.000
Adequate CSPAP resources are available for my school faculty/staff	4.42	.946	0.706	0.043	16.542	0.000
Policies in my school support the promotion of students' physical activity during school hours every school day	4.56	.974	0.704	0.043	16.297	0.000
The facilities at my school are adequate to implement a CSPAP	4.60	1.149	0.621	0.051	12.074	0.000
Our school schedule can accommodate a CSPAP	4.83	.962	0.621	0.047	13.199	0.000
Our district superintendent supports CSPAPs	4.68	.943	0.569	0.053	10.763	0.000
Sufficient professional development for CSPAP is available for my school staff	3.88	1.177	0.510	0.054	9.531	0.000
There are safe routes for active transportation (e.g. walking, biking) to/from our school	4.08	1.349	0.465	0.061	7.646	0.000
Our school's vision/mission includes the promotion of physical activity	4.07	1.190	0.324	0.057	5.734	0.000
Policies at my school support the promotion of faculty/ staff wellness (e.g. health, fitness, physical activity)	4.56	.974	0.322	0.057	5.649	0.000

CSPAP: comprehensive school physical activity programme.

Table 5. Factor covariances.

	Estimate	S.E.	Est./S.E.	Two-tailed *p*-value
F2–F1	0.491	0.049	10.014	0.000
F2–F4	0.418	0.048	8.633	0.000
F3–F2	0.376	0.048	7.821	0.000
F3–F4	0.313	0.051	6.110	0.000
F4–F1	0.245	0.058	4.232	0.000
F3–F1	0.232	0.054	4.317	0.000

Overall, principals indicated robust agreement concerning the benefits of a CSPAP for students, but they expressed less agreement about certain aspects of their involvement in CSPAPs. Based on these results, we suggest that while principals understand and appreciate the important contributions of a CSPAP to school goals, they may feel their 'boots on the ground' involvement with CSPAPs is beyond their call of duty. Since principals' active involvement in the development and

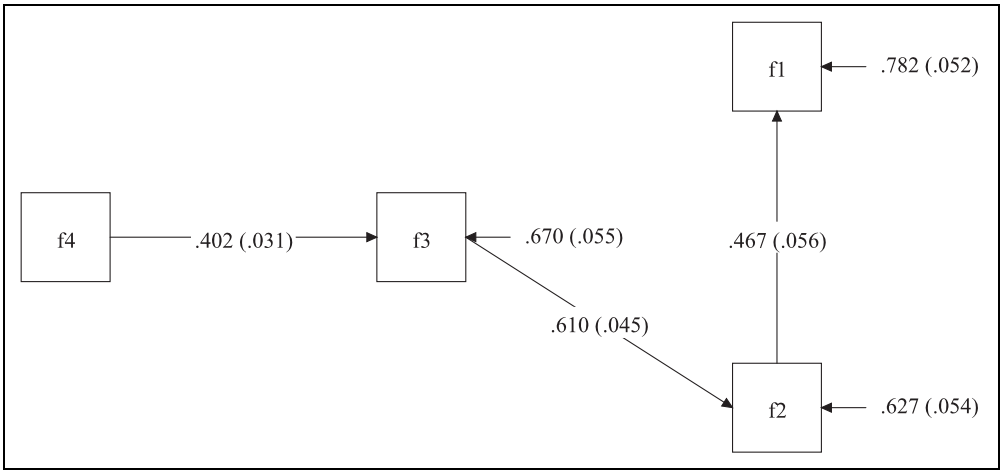

Figure 1. Path model illustrating factors associated with principals' involvement in comprehensive school physical activity programmes (CSPAPs) from a social-ecological perspective.
Factor 1 ('Involvement') is directly predicted by Factor 2 ('Intrapersonal' level of influence), while Factor 2 is directly predicted by Factor 3 ('Interpersonal' level of influence) and Factor 3 is directly predicted by Factor 4 ('Environmental' level of influence).

promotion of school programmes is critical to whether teachers feel they are supported for, and whether teachers are committed to, such programmes (Leithwood and Jantzi, 1999), initiatives to prepare principals for CSPAP implementation should emphasize the importance of their setting performance standards for the programme, serving on a CSPAP committee, and providing CSPAP-related professional development. Principals also agreed less overall that parents/guardians are interested or engaged in supporting CSPAPs. Multicomponent interventions to increase youth PA through school environments have been more effective when they include a focus on family and/or community engagement (Russ et al., 2015). Therefore, strategies to increase family engagement in CSPAPs should be another key focus of principal training.

Since we developed new measures to assess principals' CSPAP involvement and perceptions, we took several steps to increase the rigour of our measures, including an extensive literature search, two rounds of pilot testing, and psychometric analysis. ESEM with data from the main study sample indicated that the most robust and parsimonious model was a four-factor solution containing a total of 38 items. This solution supports a single factor for principals' CSPAP involvement and three social-ecological factors. The items comprising the involvement factor closely reflect the broad themes identified in published recommendations for administrators' involvement in school-based health promotion, which include collaboration, advocacy, and support (Webster et al., 2020a). This suggests that many of the ways in which principals become involved with CSPAPs may generalize to conceptualizations of school administrators' involvement in other school-based health initiatives, although additional research is needed to further explore this proposition.

The three social-ecological factors each represent distinct levels of influence in relation to such involvement, specifically intrapersonal, interpersonal, and 'environmental', which encompasses items focusing on organizational, community, and public policy variables. While proposed social-

ecological models often include five levels, it is not uncommon for researchers to collapse levels into groupings that are similar to the factors retained in the present study. Fisher et al. (2018) examined the relationship between the personal, social, and environmental factors regarding PA in community-dwelling older adults, whereas Wilk and colleagues (2018) researched the PA levels of grade 5 children by focusing on individual, interpersonal, and environmental levels of influence. Other examples include studies in which individual, social, and environmental factors were used to investigate young women's participation in PA at transitional life stages (Craike et al., 2009) and PA participation of adolescents in Spain (Devís-Devís et al., 2015).

Regarding the main focus of our study, we found significant associations between principals' CSPAP involvement and all social-ecological factors (intrapersonal, interpersonal, and environmental) assessed via the survey. Therefore, from a social-ecological perspective, variables across all levels of influence appear to be important in the extent to which principals are involved with CSPAPs. Furthermore, the strength of the relationships between factors and the results of the path analysis support our hypothesis that intrapersonal variables have the strongest and most direct association with principals' CSPAP involvement, while factors at each subsequent level – interpersonal and environmental (i.e. organizational, community, and public policy, respectively) – have an indirect and increasingly weaker association. These results are consistent with those reported in previous studies of school-based PA promotion that have used a social-ecological perspective (Langille and Rodgers, 2010; Webster and Suzuki, 2014; Webster et al., 2013). For instance, Webster et al. (2013) found that intrapersonal factors (i.e. domain-specific innovativeness and perceived attributes of PA promotion) directly predicted elementary classroom teachers' self-reported PA promotion in the classroom setting, and that the organizational level of influence (i.e. perceived school support for PA promotion) and the public policy level of influence (i.e. awareness of a state PA policy for elementary schools) were indirect predictors. Given the extant research and the results of the present investigation, we suggest that initiatives (e.g. professional development, interventions) focused on supporting school-based PA promotion should include strategies that target all levels of influence, but special attention should be given to the intraindividual level of influence. To increase principals' CSPAP involvement, it is important to ensure principals recognize the many positive outcomes that a CSPAP can help to facilitate, such as increased PA before and after school, decreased off-task behaviours, and increased academic performance (Carson and Webster, 2020).

To the authors' knowledge, this is the first study to examine principals' CSPAP involvement. Notable strengths of the study are its theoretical grounding within a social-ecological perspective, systematic development of appropriate survey measures with sound psychometric properties, and use of a stratified random national sample. However, this study is limited by the low response rate to the survey, potential response bias, and reliance solely on principals' perceptions. Future survey studies of principals' CSPAP involvement should aim to recruit proportionately representative (e.g. by state) samples and use incentives to increase the response rate. It is also worth exploring whether there are times during the year that principals may be more inclined to participate in a survey. For this study, data from the main study sample were collected in the mid-to-late spring, which coincides with end-of-year testing for many schools and may be a more hectic time for principals than the beginning or middle parts of the school year. Finally, examining others' (e.g. teachers, parents) perceptions of principals' CSPAP involvement and conducting studies that use different methods (e.g. observation) and designs (e.g. qualitative) will allow for deeper analysis of CSPAP implementation and help to build upon the results of the present study.

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References

American Alliance for Health, Physical Education, Recreation and Dance (2011) *Comprehensive School Physical Activity Program (CSPAP) survey report*. Report, Reston, VA, Spring.

Barrett P (2007) Structural equation modeling: Adjudging model fit. *Personality and Individual Differences* 42(5): 815–824.

Brener ND, Demissie Z, McManus T, et al. (2017) *School health profiles 2016: Characteristics of health programs among secondary schools*. Report, Centers for Disease Control and Prevention.

Bronfenbrenner U (1976) The experimental ecology of education. *Educational Researcher* 5(9): 5–15.

Bronfenbrenner U (1977) Toward an experimental ecology of human development. *American Psychologist* 32(7): 513–531.

Browne MW (2001) An overview of analytic rotation in exploratory factor analysis. *Multivariate Behavioral Research* 36(1): 111–150.

Bryk AS, Sebring PB, Allensworth E, et al. (2010) *Organizing Schools for Improvement: Lessons from Chicago*. Chicago, IL: University of Chicago Press.

Carson RL and Webster CA (2020) *Comprehensive school physical activity programs: Putting research into evidence-based practice*. Champaign, IL: Human Kinetics.

Carson RL, Castelli DM, Beighle A, et al. (2014) School-based physical activity promotion: A conceptual framework for research and practice. *Childhood Obesity* 10(2): 100–106.

Carson RL and Webster CA (eds) (2020) *Comprehensive School Physical Activity Programs: Putting Evidence-Based Research into Practice*. Champaign, IL: Human Kinetics.

Cattell RB (1978) *The Scientific Use of Factor Analysis in Behavioral and Life Sciences*. New York: Plenum.

Centers for Disease Control and Prevention (2011) School health guidelines to promote healthy eating and physical activity. *MMWR. Recommendations and reports: Morbidity and mortality weekly report. Recommendations and reports* 60(RR-5): 1.

Centers for Disease Control and Prevention (2013) *Comprehensive school physical activity programs: A guide for schools*. Atlanta, GA: US Department of Health and Human Services.

Centers for Disease Control and Prevention (2019) *Increasing Physical Education and Physical Activity: A Framework for Schools*. Centers for Disease Control and Prevention, US Department of Health and Human Services, Atlanta, GA.

Costello AB and Osborne JW (2005) Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research & Evaluation* 10(7): 1–9.

Craike MJ, Symons C and Zimmermann JAM (2009) Why do young women drop out of sport and physical activity? A social ecological approach. *Annals of Leisure Research* 12(2): 148–172.

Datnow A and Castellano ME (2001) Managing and guiding school reform: Leadership in success for all schools. *Educational Administration Quarterly* 37(2): 219–249.

Davis M (2012) *Principals' perceptions of factors associated with the implementation of school wellness policies*. Doctoral Dissertation, Mississippi State University, Starkville, MS.

Devís-Devís J, Beltrán-Carrillo VJ and Peiró-Velert C (2015) Exploring socio-ecological factors influencing active and inactive Spanish students in years 12 and 13. *Sport, Education and Society* 20(3): 361–380.

De Winter JD, Dodou D and Wieringa PA (2009) Exploratory factor analysis with small sample sizes. *Multivariate Behavioral Research* 44(2): 147–181.

DiStefano C, Liu J, Jiang N, et al. (2018) Examination of the weighted root mean square residual: Evidence for trustworthiness? *Structural Equation Modeling: A Multidisciplinary Journal* 25(3): 453–466.

DiStefano C, Zhu M and Mîndrilă D (2009) Understanding and using factor scores: Considerations for the applied researcher. *Practical Assessment, Research, and Evaluation* 14(1): 20. Available at: https://doi.org/10.7275/da8t-4g52.

Dow II and Oakley WF (1992) School effectiveness and leadership. *Alberta Journal of Educational Research* 38(1): 33–47.

Fink A (2003) *The Survey Handbook*. London: SAGE.

Finney SJ and DiStefano C (2006) Non-normal and categorical data in structural equation modeling. *Structural Equation Modeling: A Second Course* 10(6): 269–314.

Fisher KL, Harrison EL, Bruner BG, et al. (2018) Predictors of physical activity levels in community-dwelling older adults: A multivariate approach based on a socio-ecological framework. *Journal of Aging and Physical Activity* 26(1): 114–120.

Fullan M (2016) *The New Meaning of Educational Change*. 5th ed. New York, NY: Teachers College Press.

Golden SD, McLeroy KR, Green LW, et al. (2015) Upending the social ecological model to guide health promotion efforts toward policy and environmental change. *Health Education & Behavior* 42(Suppl 1): 8S–14S.

Greaney M, Hardwick CK, Mezgebu S, et al. (2007) Assessing the feasibility of a multi-program school-based intervention to promote physical activity and healthful eating in middle schools prior to wide-scale implementation. *American Journal of Health Education* 38(5): 250–257.

Hastie PA (2017) Revisiting the national physical education content standards: What do we really know about our achievement of the physically educated/literate person? *Journal of Teaching in Physical Education* 36(1): 3–19.

Heerwegh D (2014) *Small Sample Bayesian Factor Analysis*. Pharmaceutical Users' Software Exchange annual conference. Available at: www.Lexjansen.Com/phuse/2014/sp/SP03.pdf (accessed 9 March 2020).

Hu LT and Bentler PM (1999) Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling* 6(1): 1–55.

Institute of Medicine (2013) *Educating the student body: Taking physical activity and physical education to school*. Report. Washington, DC: The National Academies Press.

Johnson RL and Morgan GB (2016) *Survey Scales: A Guide to Development, Analysis, and Reporting*. New York, NY: The Guilford Press.

Krosnick JA and Fabrigar LR (1997) Designing rating scales for effective measurement in surveys. In: Lyberg L, Biemer P, Collins M, et al. (eds) *Survey Measurement and Process Quality*. New York: John Wiley, 141–164.

Langille JLD and Rodgers WM (2010) Exploring the influence of a social ecological model on school-based physical activity. *Health Education & Behavior* 37(6): 879–894.

Leithwood K and Jantzi D (1999) Transformational school leadership effects: A replication. *School Effectiveness and School Improvement* 10(4): 451–479.

MacCallum RC, Widaman KF, Preacher KJ, et al. (2001) Sample size in factor analysis: The role of model error. *Multivariate Behavioral Research* 36(4): 611–637.

McLeroy KR, Bibeau D, Steckler A, et al. (1988) An ecological perspective on health promotion programs. *Health Education Quarterly* 15(4): 351–377.

Marsh HW, Hau KT, Balla JR, et al. (1998) Is more ever too much? The number of indicators per factor in confirmatory factor analysis. *Multivariate Behavioral Research* 33(2): 181–220.

Marsh HW, Morin AJ, Parker PD, et al. (2014) Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology* 10(1): 85–110.

Morin AJ and Maiano C (2011) Cross-validation of the short form of the physical self-inventory (PSI-S) using exploratory structural equation modeling (ESEM). *Psychology of Sport and Exercise* 12(5): 540–554.

Morin AJS, Marsh HW and Nagengast B (2013) Chapter 10. Exploratory structural equation modeling. In: Hancock GR and Mueller RO (eds) *Structural Equation Modeling: A Second Course* (2nd ed.). Charlotte, NC: Information Age Publishing, Inc, 395–436.

Morrison LE (2006) *Principals' perceptions regarding recess in Georgia elementary schools*. Doctoral dissertation, Georgia Southern University, Statesboro, GA.

Muthén B and Asparouhov T (2012) Bayesian SEM: A more flexible representation of substantive theory. *Psychological Methods* 17: 313–335.

National Association for Sport and Physical Education (2008) *Comprehensive School Physical Activity Programs* [position statement]. Available at: https://files.eric.ed.gov/fulltext/ED541610.pdf (accessed 9 March 2020).

National Physical Activity Plan Alliance (2016) *U.S. National Physical Activity Plan*. Available at: https://physicalactivityplan.org/docs/2016NPAP_Finalforwebsite.pdf (accessed 9 March 2020).

National Physical Activity Plan Alliance (2018) *The 2018 United States report card on physical activity for children and youth*. Report. Washington, DC: National Physical Activity Plan Alliance.

Physical Activity Guidelines Advisory Committee (2018) *2018 Physical Activity Guidelines Advisory Committee scientific report*. Washington, DC: US Department of Health and Human Services.

Preacher KJ and MacCallum RC (2002) Exploratory factor analysis in behavior genetics research: Factor recovery with small sample sizes. *Behavior Genetics* 32(2): 153–161.

Rink J, Hall TJ and Williams LH (2010) *Schoolwide Physical Activity: A Comprehensive Guide to Designing and Conducting Programs*. Champaign, IL: Human Kinetics.

Russ LB, Webster CA, Beets MW, et al. (2015) Systematic review and meta-analysis of multicomponent interventions through schools to increase physical activity. *Journal of Physical Activity & Health* 12(10): 1436–1446.

Sallis JF, Cervero RB, Ascher W, et al. (2006) An ecological approach to creating active living communities. *Annual Review of Public Health* 27(1): 297–322.

Sallis JF, Owen N and Fisher EB (2008) Ecological models of health behavior. In: Glanz K, Rimer BK and Viswanath K (eds), *Health Behavior and Health Education: Theory, Research, and Practice*. San Francisco, CA: Jossey-Bass, 465–485.

Society of Health and Physical Educators (SHAPE) America (2015) Comprehensive school physical activity programs: Helping all students log 60 minutes of physical activity each day [Position statement]. Available at: www.shapeamerica.org/uploads/pdfs/2018/advocacy/position-statements/CSPAP-final.pdf (accessed 9 March 2020).

Stokols D (1996) Translating social ecological theory into guidelines for community health promotion. *American Journal of Health Promotion* 10(4): 282–298.

Turner L, Johnson TG, Slater SJ, et al. (2014) Physical activity practices in elementary schools and associations with physical education staffing and training. *Research Quarterly for Exercise and Sport* 85(4): 488–501.

US Department of Health and Human Services (2018) *Physical activity guidelines for Americans* (2nd ed.). Report. Washington, DC: US Department of Health and Human Services.

Van den Berg V, Salimi R, de Groot RH, et al. (2017) "It's a battle . . . You want to do it, but how will you get it done?": Teachers' and principals' perceptions of implementing additional physical activity in school for academic performance. *International Journal of Environmental Research and Public Health* 14(10): 1160. Available at: https://doi.org/10.3390/ijerph14101160.

Webster CA and Suzuki N (2014) Land of the rising pulse: A social ecological perspective of physical activity opportunities for schoolchildren in Japan. *Journal of Teaching in Physical Education* 33(3): 304–325.

Webster CA, Caputi P, Perreault M, et al. (2013) Elementary classroom teachers' adoption of physical activity promotion in the context of a statewide policy: An innovation diffusion and socio-ecologic perspective. *Journal of Teaching in Physical Education* 32(4): 419–440.

Webster CA, Glascoe G, Moore C, et al. (2020a) Recommendations for administrators' involvement in school-based health promotion: A scoping review. *International Journal of Environmental Research and Public Health* 17(17): 6249. Available at: https://doi.org/10.3390/ijerph17176249

Webster CA, Mîndrilă D, Moore C, et al. (2020b) Exploring the role of physical education teachers' domain-specific innovativeness, educational background, and perceived school support in CSPAP adoption. *Journal of Teaching in Physical Education* 39(1): 36–47.

Webster CA, Mîndrilă D, Moore C, et al. (2020c) Measuring and comparing physical education teachers' perceived attributes of CSPAPs: An innovation adoption perspective. *Journal of Teaching in Physical Education* 39(1): 78–90.

Webster CA, Rink JE, Carson RL, et al. (2020d). The comprehensive school physical activity program model: A proposed illustrative supplement to help move the needle on youth physical activity. *Kinesiology Review* 9(2): 112–121.

Webster CA, Weaver RG, Carman M, et al. (2020e). Staff involvement. In: Carson RL and Webster CA (eds) *Comprehensive School Physical Activity Programs: Putting Research into Evidence-Based Practice*. Champaign, IL: Human Kinetics, 127–142.

Weiler RM, Pigg RM and McDermott RJ (2003) Evaluation of the Florida coordinated school health program pilot schools project. *Journal of School Health* 73(1): 3–8.

Wilk P, Clark A., Maltby A, et al. (2018) Examining individual, interpersonal, and environmental influences on children's physical activity levels. *SSM-Population Health* 4: 76–85.

Yu C and Muthén B (2002) Evaluation of model fit indices for latent variable models with categorical and continuous outcomes. In: *Annual meeting of the American Educational Research Association*, New Orleans, LA, 1–5 April 2002.

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