



## Review

## Physical activity and healthy eating environmental audit tools in youth care settings: A systematic review

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## ABSTRACT

**Background.** There is a growing interest in evaluating the physical activity (PA) and healthy eating (HE) policy and practice environment characteristics in settings frequented by youth ( $\leq 18$  years).

**Objective.** This review evaluates the measurement properties of audit tools designed to assess PA and HE policy and practice environment characteristics in settings that care for youth (e.g., childcare, school, afterschool, summer camp).

**Method.** Three electronic databases, reference lists, educational department and national health organizations' web pages were searched between January 1980 and February 2014 to identify tools assessing PA and/or HE policy and practice environments in settings that care for youth ( $\leq 18$  years).

**Results.** Sixty-five audit tools were identified of which 53 individual tools met the inclusion criteria. Thirty-three tools assessed both the PA and HE domains, 6 assessed the PA domain and 14 assessed the HE domain solely. The majority of the tools were self-assessment tools ( $n = 40$ ), and were developed to assess the PA and/or HE environment in school settings ( $n = 33$ ), childcare ( $n = 12$ ), and after school programs ( $n = 4$ ). Four tools assessed the community at-large and had sections for assessing preschool, school and/or afterschool settings within the tool. The majority of audit tools lacked validity and/or reliability data ( $n = 42$ ). Inter-rater reliability and construct validity were the most frequently reported reliability ( $n = 7$ ) and validity types ( $n = 5$ ).

**Conclusions.** Limited attention has been given to establishing the reliability and validity of audit tools for settings that care for youth. Future efforts should be directed towards establishing a strong measurement foundation for these important environmental audit tools.

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## Context

From childhood to adolescence, children (age 3–18 years) are exposed to a variety of settings such as preschool, school, afterschool and summer camp. Nearly 60% of children age 3–5 years attend some type of childcare center and over 95% of youth age 5–17 years are enrolled in public/private schools (Story et al., 2009). Additionally, over 10 million school-age children are enrolled in afterschool programs (After School Alliance, 2014) and over 14 million youth ( $\leq 18$  years) attend summer day camps annually (America After 3 PM, 2010). Given the extended contact that youth have with these settings, whether these environments support or hinder physical activity and healthy eating habits is of critical importance.

In recent decades there has been an increased recognition of the role that the physical environment characteristics and policies and practice environment characteristics plays in shaping the physical activity levels and eating habits of youth (Brownson et al., 2008; Sallis et al., 2003). In the context of this review, physical environment characteristics refer to factors such as the size and quality of structures of fixed and portable playgrounds, green fields, facility designs and esthetics (Sallis and Glanz, 2009; Bower et al., 2008; Briefel et al., 2009), whereas, policy and practice environment characteristics include characteristics such as, having supportive physical activity and/or healthy eating written policy, provision of professional training on physical activity and/or healthy eating promotion to staff, scheduling of physical activity, quality of physical activity and food served, and monitoring and evaluation processes (Story et al., 2008; Wiecha et al., 2011; Moag-Stahlberg et al., 2008). More recently, there has been a visible increase in the prevalence of policies and standards designed to influence settings that care for youth to be more supportive of physical activity and healthy eating habits (Story et al., 2009; Wiecha et al., 2011; Moag-Stahlberg et al., 2008). Examples of these include “wellness” policies in school settings that dictate the amount and quality of daily physical education students must receive per week during the school year and/or the type of foods and beverages sold or served at schools.

In response, a wide array of audit tools designed to assess policy and practice environment characteristics have been developed. Audit tools come in a variety of forms, such as questionnaires, checklists, observation scales, and surveys. These tools are designed to capture information pertaining to the alignment or presence of physical activity and healthy eating environmental characteristics of a given setting with existing state or national policies, standards, or scientific position statements (Bower et al., 2008; Henderson et al., 2011; Ajja et al., 2012; Brener et al., 2003a). The extent to which audit tools designed to assess policy and practice environment characteristics provide an accurate reflection of such settings, however, remains unknown.

If audit tools are to provide credible information aimed at informing current and future policy decisions regarding the adoption or implementation of supportive policy and practice physical activity and healthy eating interventions (Brownson and Jones, 2009; Brownson et al., 2009; Oakes et al., 2009; Sallis, 2009), it is of critical importance that such tools demonstrate: (1) an acceptable level of reliability (defined as the ability of the tools to consistently capture the same information with repeated use and/or when used by two or more users) and (2) validity (referred to as the ability of the tools to accurately measure what they were designed or intended to measure) (Saelens and Glanz, 2009). To the authors' knowledge, no reviews have examined

audit tools designed to assess policy and practice environment characteristics in the wide range of settings that care for youth. Therefore, the aim of this review is to identify and examine the quality of policy and practice environment audit tools currently in use at various settings caring for youth.

## Evidence acquisition

### Literature search

A systematic literature search was conducted to identify tools assessing policy and practice environment characteristics related to physical activity and healthy eating in settings that care for youth (3–18 years). Three electronic databases: PubMed, Web of Science, and CINAHL were searched for all relevant articles published between January 1980 and February 2014. Search strategies for the databases included the following keywords: population (child, youth, adolescent); settings [(preschool, childcare, homecare (residential children homes), school, afterschool, summer camp)]; apparatus (tool, kit, instrument, index, survey, questionnaire, checklist, audit); quality (assessment, development, validity, reliability); and area (environmental, policy, standards, benchmarking, physical activity and nutrition). In addition to database searches, reference lists of identified articles were screened in order to identify additional tools to include in the review (Henderson et al., 2011; Ajja et al., 2012; Brener et al., 2003a; Ohri-Vachaspati and Leviton, 2010; Benjamin et al., 2007; Schwartz et al., 2009; Kim et al., 2010; Ward et al., 2008; Falbe et al., 2011; Bullock et al., 2010; Nathan et al., 2013).

Tools were also sourced from the following national education departments and health organizations' web pages: National Cancer Institute, Active Living Research, Robert Wood Johnson Foundation, Center for Diseases Control and Prevention (CDC), Yale Rudd Center for Food Policy and Obesity, National Association of School Nurses, U.S. Department of Agriculture's (USDA's) “Changing the Scene” and National Association of State Boards of Education (NASBE). The following keyword combinations were used when conducting an electronic search of national education departments and health organization web pages: wellness, policies, tool (kit), audit, assessment, resources, measurements, school (pre-, after-), summer camp, and homecare (i.e., residential children homes).

### Eligibility criteria

Tools were included in the review if they met the following inclusion criteria: (1) the tool as a whole or sections of the tool assessed physical activity and/or healthy eating policy and practice environment characteristics (e.g., written policies, provision of professional training on physical activity and/or healthy eating promotion and the credentials of staff delivering the training, scheduling of physical activity and/or snack/meals, quality of physical activity and food served, monitoring and evaluation processes), (2) the setting assessed included one or more of the following: preschool, school, afterschool, summer camp, residential children homes, (3) the tool could be used by researchers and/or non-research affiliated staff in the field, (4) it was an English language publication, and (5) the tool was available electronically or through communication with the authors. Two independent reviewers (RA and JC) screened and selected the audit tools included in the review

based on the above inclusion criteria. Tools were excluded from this review if they (1) only assessed the physical environment (e.g., facilities, room space, playground features and green field.), (2) were designed to evaluate strategies for meeting national/state policy recommendations, or (3) were a non-English publication. For the purpose of this review, we only included articles reporting psychometric properties as part of the tool development/testing procedure.

### Selection of tools

The electronic search strategies were executed by two independent researchers (RA and JC). Disagreements were discussed and resolved, and, if required, a third reviewer (MWB) was consulted. A copy of the latest version of the tools included in the review was retrieved, and when available, the full text papers reporting on tool measurement properties that fulfilled the inclusion criteria were also retrieved.

### Description of tools

The following information was extracted from the tools included in this review: (i) name of the tool, (ii) developer; (iii) the purpose of the tool development; (iv) setting; (v) intended users; (vi) data collection method; (vii); time frame needed to complete the tool; (viii) number of items in the tool; and (ix) domains (e.g., written policy, child feedback, time allocated for physical activity, type of activity, staff professional training, screen time, time allocated for snack/meals, meal quality and evaluation) assessed by the tool. In addition, when psychometric (i.e., reliability and/or validity) information of the tool was available, the following information was extracted: (i) type of validity and/or reliability evaluated; (ii) time frame for reliability testing (test–retest); (iii) type of analysis used; (iv) validity comparison, and (v) reliability and validity findings.

### Evidence synthesis

#### Description of tools

A total of 123 tools were identified from the initial search of the three databases, review of references from these articles, and from a search of national health organizations/agencies' web pages. After excluding duplicates, 65 tools were retained, of which 53 tools were included in this review based on the inclusion/exclusion criteria (Fig. 1).

Table 1 presents summaries of the audit tools included in this review. Policy and practice environment characteristics were evaluated solely in 34 tools (Wellness Child Care Assessment Tool (WellCCAT); Childcare Director Interview; Child Care Nutrition and Physical Activity Policies – Nutrition Standards; Child Care Nutrition and Physical Activity Policies – Eating Environment; Child Care Nutrition and Physical Activity Policies – Nutrition Education; Child Care Nutrition and Physical Activity Policies – Physical Activity; Child Care Nutrition and Physical Activity Policies–communication & promotion; Child Care Nutrition and Physical Activity Policies – Evaluation; School Health Policies and Practices Study (SHPPS), 2006a,b,c; Rhode Island Needs Assessment (RINAT); Abbreviated Wellness School Assessment Tool (WellSAT); Wellness School Assessment Tool (WellSAT); Student Wellness Toolkit; Student Wellness Toolkit – High School; Student Wellness Toolkit – Middle School; Competitive Foods and Beverages Toolkit; Policy and Systems Toolkit; Local Wellness Policy Checklist; Healthy Afterschool Activity and Nutrition Documentation Instrument (HAAND); Program Self-assessment Observation Tool; 2 Minute Program Assessment; Policy Assessment Tool; Healthy Community Checklist; Nutrition Environment Assessment Tool (NEAT); New Hampshire – School Wellness Policy Assessment Form; California Department of Education Nutrition Services Division, 2006; Michigan's Healthy School Action Tools (HSAT) – Nutrition Service; French et al., 2002; Johanson and Wootan, 2003; Lytle, 2006; Local Wellness Policy;

Michigan's Healthy School Action Tools (HSAT) – School Health and Safety Policies; Neumark-Sztainer Food Policies and Practices Questionnaire) compared to 19 tools (Nathan et al., 2013; School Health Index (SHI) - Elementary School, 2012; School Health Index (SHI) - Middle/High School, 2012; Whitaker et al., 2009; Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC); Environment and Policy Assessment and Observation (EPAO); Child Care Nutrition and Physical Activity Assessment Survey; Rhode Island Nutrition and PA Survey; School Physical Activity Policy Assessment; Food and beverage environment analysis and monitoring system (FoodBEAMS); Food and Fitness School Health Policies and Practices Questionnaire; School Meals Program Toolkit; Michigan's Healthy School Action Tools (HSAT) – Physical Education and Other Physical Activity Opportunities; Mississippi School Nutrition and Physical Activity Environment Assessment; Gold Medal Rating Scale – Elementary; Gold Medal Rating Scale – Middle and High; Illinois Needs Assessment and Annual Evaluation Tool; The Environmental Nutrition and Physical Activity Community Tool (ENACT); Community Healthy Living Index (CHLI)) which assessed both policy and practice environment characteristics and the physical characteristics. Physical activity and healthy eating domains were assessed in 33 tools (Nathan et al., 2013; Wellness Child Care Assessment Tool (WellCCAT); Childcare Director Interview; Child Care Nutrition and Physical Activity Policies–communication & promotion; Child Care Nutrition and Physical Activity Policies – Evaluation; School Health Policies and Practices Study (SHPPS), 2006a; Rhode Island Needs Assessment (RINAT); Abbreviated Wellness School Assessment Tool (WellSAT); Wellness School Assessment Tool (WellSAT); Student Wellness Toolkit; Student Wellness Toolkit – High School; Student Wellness Toolkit – Middle School; Policy and Systems Toolkit; Local Wellness Policy Checklist; Healthy Afterschool Activity and Nutrition Documentation Instrument (HAAND); Program Self-assessment Observation Tool; 2 Minute Program Assessment; Policy Assessment Tool; Healthy Community Checklist; New Hampshire – School Wellness Policy Assessment Form; Michigan's Healthy School Action Tools (HSAT) – School Health and Safety Policies; School Health Index (SHI) - Elementary School, 2012; School Health Index (SHI) - Middle/High School, 2012; Whitaker et al., 2009; Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC); Environment and Policy Assessment and Observation (EPAO); Child Care Nutrition and Physical Activity Assessment Survey; Rhode Island Nutrition and PA Survey; Food and Fitness School Health Policies and Practices Questionnaire; Mississippi School Nutrition and Physical Activity Environment Assessment; Illinois Needs Assessment and Annual Evaluation Tool; The Environmental Nutrition and Physical Activity Community Tool (ENACT); Community Healthy Living Index (CHLI)) compared to six tools (Child Care Nutrition and Physical Activity Policies – Physical Activity; School Health Policies and Practices Study (SHPPS), 2006c; School Physical Activity Policy Assessment; Michigan's Healthy School Action Tools (HSAT) – Physical Education and Other Physical Activity Opportunities; Gold Medal Rating Scale – Elementary; Gold Medal Rating Scale – Middle and High) that assessed only physical activity domain and 14 tools (Child Care Nutrition and Physical Activity Policies – Nutrition Standards; Child Care Nutrition and Physical Activity Policies – Eating Environment; Child Care Nutrition and Physical Activity Policies – Nutrition Education; School Health Policies and Practices Study (SHPPS), 2006b; Competitive Foods and Beverages Toolkit; Nutrition Environment Assessment Tool (NEAT); California Department of Education Nutrition Services Division, 2006; Michigan's Healthy School Action Tools (HSAT) – Nutrition Service; French et al., 2002; Johanson and Wootan, 2003; Lytle, 2006; Neumark-Sztainer Food Policies and Practices Questionnaire; Food and beverage environment analysis and monitoring system (FoodBEAMS); School Meals Program Toolkit) that assessed only healthy eating domain.

School was the setting with the most tools assessing physical activity and/or healthy eating environments (n = 33) (Nathan et al., 2013; School Health Policies and Practices Study (SHPPS) (2006a,b,c); Rhode Island

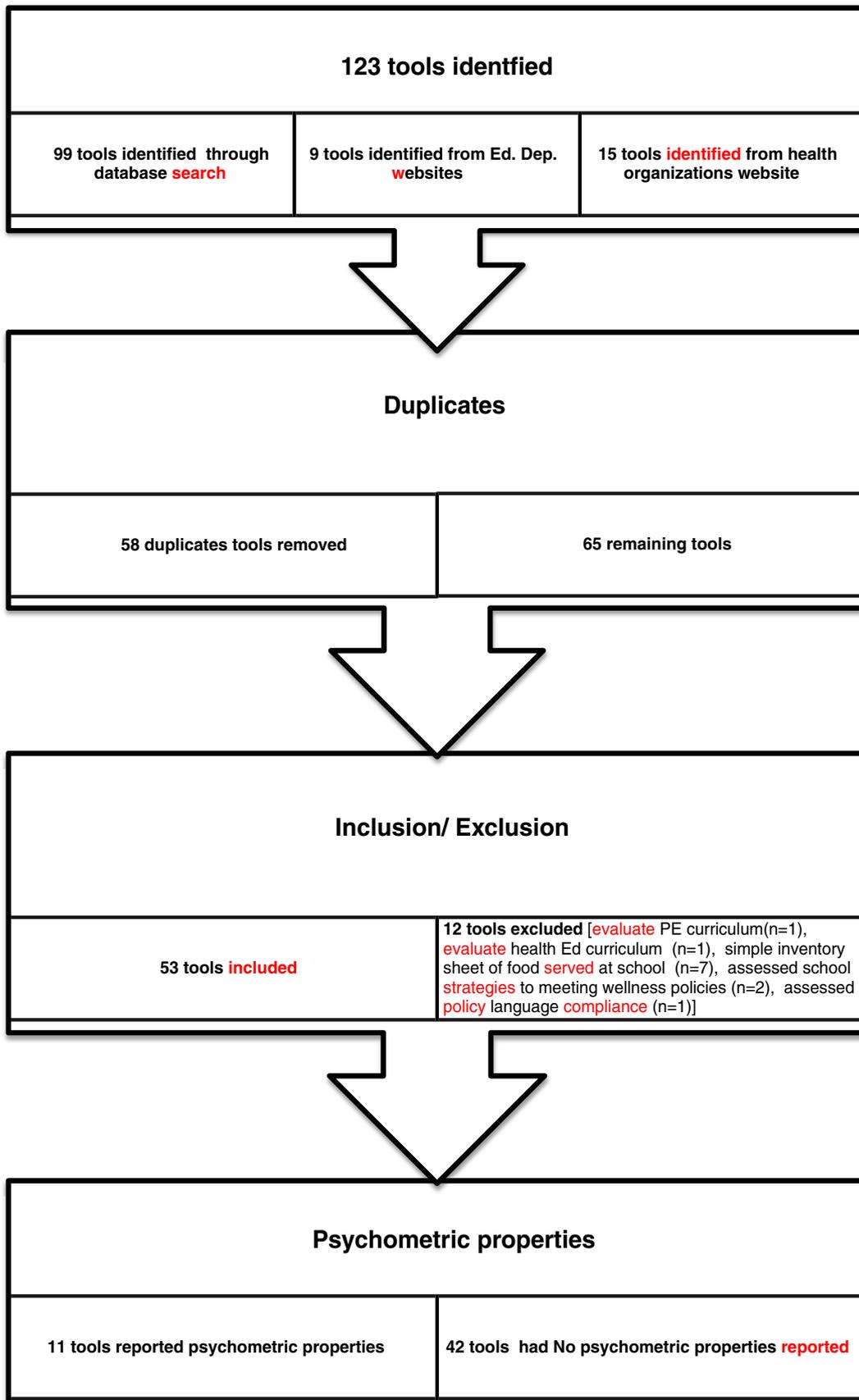


Fig. 1. Tool selection process.

Needs Assessment (RINAT); Abbreviated Wellness School Assessment Tool (WellsAT); Wellness School Assessment Tool (WellsAT); Competitive Foods and Beverages Toolkit; Policy and Systems Toolkit; Local Wellness Policy Checklist; New Hampshire – School Wellness Policy Assessment Form; California Department of Education Nutrition Services Division, 2006; Michigan's Healthy School Action Tools (HSAT) – Nutrition Service; Johanson and Wootan, 2003; Lytle, 2006; Michigan's Healthy School Action Tools (HSAT) – School Health and Safety Policies; Neumark-Sztainer Food Policies and Practices Questionnaire; School Health Index (SHI) - Elementary School, 2012; School Health Index (SHI) - Middle/High School, 2012; Rhode Island Nutrition and PA Survey; School Physical Activity Policy Assessment; Food and beverage environment analysis and monitoring system (FoodBEAMS); Food and Fitness School Health Policies and Practices Questionnaire; School Meals Program Toolkit; Michigan's Healthy School Action Tools (HSAT) – Physical Education and Other Physical Activity Opportunities; Mississippi School Nutrition and Physical Activity Environment Assessment; Gold Medal Rating Scale – Elementary; Gold Medal Rating Scale – Middle and High; Illinois Needs Assessment and Annual Evaluation Tool; French, 2003) followed by childcare settings (n = 12) (Wellness Child Care Assessment Tool (WellCCAT); Childcare director interview; Child Care Nutrition and Physical Activity Policies – Nutrition Standards; Child Care Nutrition and Physical Activity Policies – Eating Environment; Child Care Nutrition and Physical Activity Policies – Nutrition Education; Child Care Nutrition and Physical Activity Policies – Physical Activity; Child Care Nutrition and Physical Activity Policies-communication & promotion; Child Care Nutrition and Physical Activity Policies – Evaluation; Whitaker et al., 2009; Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC); Environment and Policy Assessment and Observation (EPAO); Child Care Nutrition and Physical Activity Assessment Survey). There were 4 tools (Healthy Afterschool Activity and Nutrition Documentation Instrument (HAAND); Program Self-assessment Observation Tool; 2 Minute Program Assessment; Policy Assessment Tool) evaluating afterschool settings and 4 tools (Healthy Community Checklist; Nutrition Environment Assessment Tool (NEAT); The Environmental Nutrition and Physical Activity Community Tool (ENACT); Community Healthy Living Index (CHLI)) evaluating community settings with sections dedicated to evaluating childcare, school, and/or the afterschool setting. Forty out of the 53 tools (Child Care Nutrition and Physical Activity Policies – Nutrition Standards; Child Care Nutrition and Physical Activity Policies – Eating Environment; Child Care Nutrition and Physical Activity Policies – Nutrition Education; Child Care Nutrition and Physical Activity Policies – Physical Activity; Child Care Nutrition and Physical Activity Policies-communication & promotion; Child Care Nutrition and Physical Activity Policies – Evaluation; Student Wellness Toolkit; Student Wellness Toolkit – High School; Student Wellness Toolkit – Middle School; Competitive Foods and Beverages Toolkit; Policy and Systems Toolkit; Local Wellness Policy Checklist; Program Self-assessment Observation Tool; 2 Minute Program Assessment; Policy Assessment Tool; Healthy Community Checklist; Nutrition Environment Assessment Tool (NEAT); New Hampshire – School Wellness Policy Assessment Form; California Department of Education Nutrition Services Division, 2006; Michigan's Healthy School Action Tools (HSAT) – Nutrition Service; Johanson and Wootan, 2003; Michigan's Healthy School Action Tools (HSAT) – School Health and Safety Policies; School Health Index (SHI) - Elementary School, 2012; School Health Index (SHI) - Middle/High School, 2012; Whitaker et al., 2009; Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC); Child Care Nutrition and Physical Activity Assessment Survey; Rhode Island Nutrition and PA Survey; School Physical Activity Policy Assessment; Food and Fitness School Health Policies and Practices Questionnaire; School Meals Program Toolkit; Michigan's Healthy School Action Tools (HSAT) – Physical Education and Other Physical Activity Opportunities; Gold Medal Rating Scale – Elementary; Gold Medal Rating Scale – Middle and High; Illinois Needs Assessment and Annual

Evaluation Tool; The Environmental Nutrition and Physical Activity Community Tool (ENACT); Community Healthy Living Index (CHLI)) were categorized as self-assessment tools designed to be used by staff/community members, 12 tools (Nathan et al., 2013; Wellness Child Care Assessment Tool (WellCCAT); Childcare Director Interview; School Health Policies and Practices Study (SHPPS), 2006a,b,c; Rhode Island Needs Assessment (RINAT); Abbreviated Wellness School Assessment Tool (WellsAT); Wellness School Assessment Tool (WellsAT); Lytle, 2006; Environment and Policy Assessment and Observation (EPAO); Food and Beverage Environment Analysis and Monitoring System (FoodBEAMS) were designed to be completed by researchers/public health practitioners for research purposes or for assessments within specific projects, and a single tool (Healthy Afterschool Activity and Nutrition Documentation Instrument (HAAND)) was intended to be used by both researchers and staff members.

The majority of the tools assessing physical activity focused on items such as written policies (n = 31) and time allocation (n = 31). A considerable number of tools included items such as activity types (n = 26), staff training (n = 20), curriculum (n = 19), staff behavior (n = 16), staff credentials (n = 16), and screen time (n = 14). Fewer tools included items such as evaluation and monitoring process (n = 10), parent workshop (n = 8), child involvement (n = 5), and barriers and support (n = 4). When healthy eating was evaluated, the majority of tools focused on written policies (n = 40) and menu quality (n = 30). The majority of tools included staff training (n = 26), behavior (n = 19), access to water (n = 21), access to vending machines (n = 18), curriculum (n = 18), food safety (n = 12) and child involvement (n = 12). Fewer tools included meals/snack schedules (n = 10), parent workshops (n = 10), evaluation (n = 10), staff credentials (n = 9), and barriers and support (n = 2).

#### Reliability

Inter-rater reliability (Table 2) was the most commonly tested type of reliability (n = 7) (Ajja et al., 2012; Benjamin et al., 2007; Kim et al., 2010; Ward et al., 2008; Falbe et al., 2011; Bullock et al., 2010) followed by test-retest (n = 3) (Benjamin et al., 2007; Brener et al., 2003b; Lounsbury et al., 2012), and internal consistency (n = 1) (Falbe et al., 2011). For reliability assessment, studies reported Pearson's correlation, Cronbach's  $\alpha$ , kappa coefficient, percent agreement and/or interclass correlation coefficient (ICC) scores. The following tools had the highest reliability coefficients: the Wellness Child Care Assessment Tool (WellCCAT) (Falbe et al., 2011) with an ICC ranging from 0.84–0.99; the Food and Beverage Environment Analysis and Monitoring System (FoodBEAM) (Bullock et al., 2010), with an ICC ranging from 0.97–0.99; the Community Healthy Living Index (CHLI) (Kim et al., 2010), with percent agreement ranging from 84%–93%; and the Healthy Afterschool Activity and Nutrition Documentation (HAAND) (Ajja et al., 2012) with percent agreement ranging from 85%–100% and kappa coefficients ranging from 0.73–1.00.

#### Validity

Construct validity (Table 2) was the most reported type of validity (n = 5) (Ajja et al., 2012; Benjamin et al., 2007; Ward et al., 2008; Falbe et al., 2011; Brener et al., 2003b), followed by face and/or content validity (n = 3) (Ajja et al., 2012; Benjamin et al., 2007; Lounsbury et al., 2012), criterion validity (n = 2) (Benjamin et al., 2007; Henderson, 2011) and convergent validity (n = 1) (Bullock et al., 2010). Construct validity comparisons were made: against national expert review (Benjamin et al., 2007), comparison to environmental characteristic scores among sites using groups expected to differ due to known characteristics (Ward et al., 2008; Falbe et al., 2011), and objective measures of child-level physical activity such as pedometers (Ajja et al., 2012) and direct observation (Nathan et al., 2013). For validity assessment, studies reported Pearson's correlation coefficient (r), weighted kappa coefficient,

**Table 1**  
Description of environmental audit tools assessing healthy eating and physical activity.

Tool name	Setting	Developer	Purpose	User	
				Staff/community member (self-assessment)	Researcher
Child Care Nutrition and Physical Activity Assessment Survey	Childcare	Rudd Center for Food Policy and Obesity, Yale University.	To evaluate nutrition and physical activity environment of child care centers.	●	
Child Care Nutrition and Physical Activity Policies – Communication & Promotion	Childcare	Connecticut State Department of Education.	To assess communication level and health promotion strategies of childcare centers in the state of Connecticut.	●	
Child Care Nutrition and Physical Activity Policies – Eating Environment	Childcare	Connecticut State Department of Education.	To assess nutrition standards of childcare centers in the state of Connecticut.	●	
Child Care Nutrition and Physical Activity Policies – Evaluation	Childcare	Connecticut State Department of Education.	To assess evaluation policies of childcare centers in the state of Connecticut.	●	
Child Care Nutrition and Physical Activity Policies – Nutrition Education	Childcare	Connecticut State Department of Education.	To assess nutrition education of childcare centers in the state of Connecticut.	●	
Child Care Nutrition and Physical Activity Policies – Nutrition Standard	Childcare	Connecticut State Department of Education.	To assess nutrition standards of childcare centers in the state of Connecticut.	●	
Child Care Nutrition and Physical Activity Policies – Physical Activity	Childcare	Connecticut State Department of Education.	To assess nutrition standards of childcare centers in the state of Connecticut.	●	
Childcare director interview	Childcare	Rudd Center for Food Policy and Obesity, Yale University.	To assess nutrition and physical activity environment at childcare settings.		●
Environment and Policy Assessment and Observation (EPAO)	Childcare	Ward et al., Center for Health Promotion and Disease Prevention, University of North Carolina at Chapel Hill.	To evaluate the Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC).		●
Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC)	Childcare	Ward et al., Nutrition and Physical Activity Self-Assessment for Child Care (NAP SACC), Center for Health Promotion and Disease Prevention and Department of Nutrition, University of North Carolina at Chapel Hill.	Developed for the Nutrition and Physical Activity Self-assessment for Child Care Program (NAP SACC) intervention.	●	
Study of Healthy Activity and Eating Practices and Environments in Head Start (SHAPES) Self-assessment Survey	Childcare	Whitaker et al., Department of Public Health and Pediatrics, Center for Obesity Research and Education, Temple University.	To evaluate nutrition and physical activity environments in childcare setting.	●	
Wellness Child Care Assessment Tool (WellCCAT)	Childcare	Falbe et al., Rudd Center for Food Policy and Obesity, Yale University.	To assess written health-related policies (i.e., nutrition and physical activity and wellness policies).		●
Abbreviated Wellness School Assessment Tool (WellSAT)	School	Robert Wood Johnson Foundation Healthy Eating Research Program, Working Group 1.	To evaluate the quality of existing schools' district wellness policies.		●
Competitive Foods and Beverages Toolkit	School	Alliance for Healthier Generation.	To help schools evaluate the presence of competitive food and Beverages at their schools.	●	
Food and Beverage Environment Analysis and Monitoring System (FoodBEAMS)	School	Samuels and Associates	Developed to capture the following:  <ul style="list-style-type: none"> <li>• Venues where competitive foods and beverages are sold.</li> <li>• Types of foods and beverages sold.</li> </ul>		●
Food and Fitness School Health Policies and Practices Questionnaire	School	Turner, Bridging the Gap Research Program.	Compliance of foods and beverages with the California school nutrition standards for competitive foods Developed as part of a study to assess school s' health policy and programs.	●	
Gold Medal Rating Scale – Elementary School	School	Massachusetts Action for Healthy Kids supported by the MetroWest Community Health Care Foundation.	Developed as part of Action for Healthy Kids initiative for schools to assess their local wellness policies.	●	
Gold Medal Rating Scale – Middle & High School	School	Massachusetts Action for Healthy Kids supported by the MetroWest Community Health Care Foundation.	Developed as part of Action for Healthy Kids initiative for schools to assess their local wellness policies.	●	
Illinois Needs Assessment & Evaluation Tool	School	Illinois State Board of Education.	Developed to evaluate the local schools wellness policies and practice in Illinois.	●	
Local Wellness Policy	School	National Team Nutrition Office for the Colorado Healthy Schools Summit.	Developed to assess local schools wellness programs.	●	

(continued on next page)

Table 1 (continued)

Tool name	Setting	Developer	Purpose	User	
				Staff/community member (self-assessment)	Researcher member
Michigan's Healthy School Action Tools (HSAT) – Nutrition service	School		Developed for Michigan schools to create healthier environments initiative.	●	
Michigan's Healthy School Action Tools (HSAT) – Physical education and other physical activity opportunities	School		Developed for Michigan schools to create healthier environments initiative.	●	
Michigan's Healthy School Action Tools (HSAT) – School Health & Safety Policies	School		Developed for Michigan schools to create healthier environments initiative.	●	
Mississippi School Nutrition and Physical Activity Environment Assessment	School	Mississippi Department of Education.	Developed for Mississippi schools to evaluate their health and wellness environment.	●	
Neumark–Sztainer Food Policies and Practices questionnaire	School	Developed by the Minnesota Association of Secondary School Principals and the University of Minnesota, Division of Epidemiology.	To evaluate high school food policy and practice environment.	●	
New Hampshire School Wellness Policy Assessment Form	School	New Hampshire Department of Education Local.	Developed to evaluate the New Hampshire schools wellness policies and practice complete school environment.	●	
Policy and Systems Toolkit	School	Alliance for Healthier Generation.	Developed to be used by schools enrolled in the Healthy Schools Program	●	
Principals Survey	School	Lytle et al., Division of Epidemiology, University of Minnesota.	Developed as part of the TEENS intervention project.		●
Rhode Island Nutrition & PA survey	School	Rhode Island Healthy Schools Coalition.	Developed for Rhode Island schools to assess their school environment with respect to nutrition and physical activity.	●	
Rhode Island Needs Assessment Tool (RINAT)	School	Pearlman, Rhode Island Department of Health.	Developed as part of needs assessment and intervention project in Rhode Island schools.		●
School Environment Assessment Tool (SEAT)	School	Nathan et al., Hunter New England Population Health and School of Medicine and Public Health, The University of Newcastle, Australia.	Developed to assess quality of school food and physical activity environment.		●
School food policies and practices: a state-wide survey of secondary school principals	School	French 2002. University of Minnesota, Division of Epidemiology.	To evaluate food related policies and practices in secondary schools in Minnesota.	●	
School Health Index (SHI) (2012) – Elementary School	School	Centers for Disease Control and Prevention.	Developed for schools to assess health and safety policy and for planning.	●	
School Health Index (SHI) (2012) – Middle/High school	School	Centers for Disease Control and Prevention.	Developed for schools to assess health and safety policy and for planning.	●	
School Health Policies and Practices Study (SHPPS 2006) questionnaire – Nutrition	School	Centers for Disease Control and Prevention.	Developed for the School Health Policies and Practices study.		●
School Health Policies and Practices Study (SHPPS 2006) questionnaires – Physical Education and Activity	School	Centers for Disease Control and Prevention.	Developed for the School Health Policies and Practices study.		●
School Health Policies and Practices Study (SHPPS 2006) questionnaires – School Policy & Environment	School	Centers for Disease Control and Prevention.	Developed for the School Health Policies and Practices study.		●
School Meals Program Toolkit	School	Alliance for Healthier Generation.	Developed to be used by schools to evaluate the quality of the school meals provided as part of assessing school wellness policies and practice programs.	●	
School Nutrition by Design	School	California Department of Education Nutrition Services Division.	Developed as part of the recommendation of State Superintendent Advisory Committee on Nutrition Implementation Strategies.	●	
School Physical Activity Policy Assessment (S-PAPA)	School	Lounsbery et al., University of Nevada, Las Vegas	Developed to assesses physical activity policy at the district & school level.	●	
Student Wellness Toolkit – Elementary school	School	Alliance for Healthier Generation.	Developed to be used by elementary schools to evaluate overall school wellness policies and practice	●	
Student Wellness Toolkit – High School	School	Alliance for Healthier Generation.	Developed to be used by high schools to evaluate overall school wellness policies and practice	●	
Student Wellness Toolkit – Middle School	School	Alliance for Healthier Generation.	Developed to be used by middle schools to evaluate	●	

Survey of school vending machines	School	Johanson and Wootan. Center for Science in the Public Interest (CSPI).	overall school wellness policies and practice Developed as part of the CSPI nutrition policy project to evaluate the nutrition quality of food in school vending machines.	●	
Wellness School Assessment Tool ( <i>WellSAT-96</i> )	School	Robert Wood Johnson Foundation Healthy Eating Research Program, Working Group 1.	To provide a standard method for assessing school district wellness policies.		●
Community Healthy Living Index (CHLI)	Community	Y-USA collaborated with Stanford, Harvard, and St. Louis Universities.	To examine environmental and social supports for healthy eating and active living.	●	
Healthy Community Checklist	Community	Michigan Healthy Communities Collaborative.	To assess community's health environment with regard to promoting and supporting:  • Physical activity. • Healthy eating & healthy weight.	●	
Nutrition Environment Assessment Tool (NEAT) – Section 3 (school)	Community	Michigan Healthy Community Collaboration.	Smoke-free environments & tobacco-free lifestyles. Developed to help communities assess how supportive their environment is to healthy eating.	●	
The Environmental Nutrition and Physical Activity Community Tool (ENACT)	Community	Strategic Alliance (California).	Developed to help community assess current policy status and develop an action plan.	●	
2 Minute Program Assessment	Afterschool	Harvard School of Public Health Prevention Research Center as part of the Out of School Nutrition and Physical Activity (OSNAP) Initiative.	To assess how closely program adheres to the OSNAP nutrition and physical activity environmental standards.	●	
Healthy Afterschool Activity and Nutrition Documentation Instrument (HAAND)	Afterschool	Ajja et al., Arnold School of Public Health, University of South Carolina, Columbia.	To assess the extent to which the afterschool environment meets current physical activity and nutrition policies.	●	●
Policy assessment tool	Afterschool	Harvard School of Public Health Prevention Research Center as part of the Out of School Nutrition and Physical Activity (OSNAP) Initiative.	To identify existing nutrition, physical activity and screen time policies.	●	
Program self-assessment observation tool	Afterschool	Harvard School of Public Health Prevention Research Center as part of the Out of School Nutrition and Physical Activity (OSNAP) Initiative.	To assess the nutrition and physical activity of program during the OSNAP intervention.	●	

Table 1 Extended

Data collection method				Time frame	No. of items	Domain of physical activity environment covered		Domain of nutrition environment covered		Note
Observation	Document review	Interview	Self-report			Environmental (Policy/practice) characteristics	Physical characteristics	Environmental (Policy/practice) characteristics	Physical characteristics	
●	●			1 day site visit	43	Policy, activity types, screen time, staff behavior, training barriers and support	Equipment, space	Policy, menu quality, meal schedule, food safety, staff behavior, training, curriculum, access (water)		Close-ended questions with appropriate responses as follows:  – Choose one response category from several possible answers.
	●			Not reported	12	Policy, staff behavior		Policy, staff behavior, advertising		Close-ended questions with appropriate responses as follows: Full/Partial/None/NA
	●			Not reported	31			Policy, meal schedule, food safety, staff behavior, training		Close-ended questions with appropriate responses as follows: Full/Partial/None/NA
	●			Not reported	6	Policy, evaluation		Policy, evaluation		Close-ended questions with appropriate responses as follows: Full/Partial/None/NA
	●			Not reported	17			Policy, staff behavior, curriculum, advertising		Close-ended questions with appropriate responses as follows: Full/Partial/None/NA
	●			Not reported	51			Policy, menu quality, meal schedule, food safety, access (water, vending machines), fundraising		Close-ended question with appropriate responses as follows: Full/Partial/None/NA.
	●			Not reported	45	Policy, amount of time allocated, activity types, screen time, staff behavior, curriculum	Equipment, space, safety			Close-ended questions with appropriate responses as follows: Full/Partial/None/NA
		●		Not reported	73	Policy, amount of time allocated, screen time, staff behavior, training barriers and support		Policy, staff behavior/modeling and training, nutrition curriculum, barriers and support, fundraising		Close-ended questions with appropriate responses as follows:  – Yes/No – Choose one response category from several possible answers.
●	●			1 full day visit	192	Policy, amount of time allocated, activity types, screen time, staff behavior and training, curriculum	Space, equipment, safety	Policy, menu quality, meal schedule, staff behavior/modeling, training, nutrition curriculum, access (water, vending machines), fundraising	Vending machine location	Close-ended questions with appropriate responses as follow: yes/no Choose one response category from several arranged in hierarchical order.
●	●			1 full day visit	56	Policy, amount of time allocated, activity types, screen time, staff behavior, training	Equipment, space	Policy, menu quality, meal schedule, staff behavior, training, access (water/vending machines), fundraising		Close-ended questions. Each question has 4 possible response options ranging from minimum standard to best practice.
		●		30 min	90	Policy, amount of time allocated, screen time, curriculum	Space, equipment	Policy, menu quality, staff behavior/modeling, curriculum, fundraising		Close-ended questions with appropriate responses as follows: Yes/No
	●			N/A	64	Policy, amount of time allocated, activity types, screen time, staff behavior, training, curriculum, evaluation	Safety, space	Policy, menu quality, meal schedule, staff behavior, training, access (water), curriculum, evaluation, fundraising		Close-ended questions with 4 possible response options ranging from:  – 0, 1, 2, NA
	●			45 min	50	Policy, amount of time allocated, activity types, staff behavior, training and credentials, curriculum, evaluation,	Equipment	Policy, child involvement, menu quality, meal schedule, staff behavior, training and credentials, food safety, access (water, vending machines), curriculum, advertising, fundraising,		School policy statement are rated “0”, “1” or “2” rating “3” and “4” only apply to specific section 3
		●		Not reported	8			Policy, access (vending machines).		Uses best practice framework of criteria at the bronze, silver and gold levels as a

Table 1 (continued)

●	Varies based on school size and number, location where food is sold	N/A			Policy, menu quality, access (vending machines), advertising, fundraising.		way of scoring the program policy. Online assessment tool. Data collector enters the information guided by the software that matches the information items with nutrient profile which is housed in the nutrient database in imbedded in the software. Software has a drop-down menu as well as the ability to add new items not in the database.
●	Not reported	100	Policy, amount of time allocated, activity types, staff credentials, curriculum, barriers and support.	Equipment	Policy, menu quality, meal schedule, access (vending machines), curriculum, fundraising.		Combination of close- and open-ended questions: Close-ended questions: possible responses Yes/No Choose one response category from several possible answers Likert scale
●	Not reported	29	Policy, amount of time allocated, activity types, staff behavior, training.	Safety			Close-ended questions with possible responses. Choose one response category from several arranged in hierarchical order.
●	Not reported	33	Policy, amount of time allocated, staff behavior, training, curriculum.	Safety			Close-ended questions with possible responses. Choose one response category from several arranged in hierarchical order.
●	Not reported	49	Policy, amount of time allocated, staff behavior training.	Safety	Policy, child involvement, menu quality, meal schedule, food safety, staff behavior, training, advertising.	Food facility	Close-ended questions with possible responses as follows:
●	Not reported	40	Amount of time allocated, staff behavior and credentials, curriculum.	Space	Menu quality, meal schedule, food facility, staff behavior, training, access (water), fundraising.	Food facility	<ul style="list-style-type: none"> <li>- OK/Need For Improvement</li> </ul> Close-ended questions with possible responses as follows: <ul style="list-style-type: none"> <li>- fully implemented</li> <li>- partially implemented</li> <li>- still in planning</li> <li>- not applicable</li> <li>- Don't know</li> </ul>
●	2 to 7 h	51			Policy, menu quality, meal schedule, staff behavior, training and credentials, fundraising.		Combination of open ended and close ended questions with possible reposes ranging from: <ul style="list-style-type: none"> <li>- Yes/No</li> </ul>
●	2 to 7 h	92	Policy, amount of time allocated, activity types, staff behavior, training and credentials, curriculum.	Equipment			Choose the most appropriate statement Combination of open-ended and close-ended questions with possible responses ranging from: <ul style="list-style-type: none"> <li>- Yes/No.</li> </ul>
●	2 to 7 h	353	Child involvement, amount of time allocated, activity types, staff behavior, training, evaluation.	Equipment, space, safety	Policy, child involvement, menu quality, meal schedule, food safety, staff behavior, training, access (water, vending machine), evaluation, food safety, advertising, fundraising.	Food facility	Choose the most appropriate statement. Combination of open-ended and close-ended questions with possible responses ranging from: <ul style="list-style-type: none"> <li>- Yes/No.</li> </ul>
●	Not reported	57	Amount of time allocated,	Equipment	Policy, child involvement, menu		Choose the most appropriate statement. Close-ended questions: Choose one response

(continued on next page)

Table 1 (continued)

Data collection method				Time frame	No. of items	Domain of physical activity environment covered		Domain of nutrition environment covered		Note
Observation	Document review	Interview	Self-report			Environmental (Policy/practice) characteristics	Physical characteristics	Environmental (Policy/practice) characteristics	Physical characteristics	
			●	Not reported	36	screen time, curriculum.		quality, meal schedule, food safety, food facility, staff training, access (water, vending machines), curriculum, advertising		category from several arranged in hierarchical order.  Close-ended questions possible responses:  – Yes/No – Likert scale. – Choose one response category from several arranged in hierarchical order.
			●	Not reported	50	Policy, type, staff behavior, training, credentials, evaluation		Policy, nutrition curriculum, staff behavior, training, meal schedule, evaluation, fundraising.		Close-ended questions with:  – Yes/No response  Points reported as numeric scores and percentages Uses best practice framework of criteria at the bronze, silver and gold levels as a way of scoring the program policy.
			●	Not reported	8	Policy, child involvement.		Policy, menu quality, food facility, staff behavior, training.		Combination of open-ended and close-ended questions:  – Close-ended questions possible responses: Yes/No/Don't know
			●	Not reposted	22			Policy, menu quality, staff training, advertising		Combination of open-ended and open-ended questions. Close-ended questions possible responses:
			●	Not reported	49	Amount of time allocated, staff behavior, staff credentials.	Equipment, space,	Policy, menu quality, meal schedule, staff behavior, training, access (vending machine), curriculum		– Yes/No Combination of open-ended and close-ended questions: Close-ended questions possible response answers:  – Yes/No – Likert scale
			●	Not reported	40	Policy, child involvement, amount of time allocated, barriers and support.	Space	Policy, child involvement, barriers, advertising, access (vending machines).		Close-ended questions with possible responses: Yes/No/Don't know Close-ended questions
			●	20 min	65	Amount of time allocated, screen time.	Facility, equipment,	Menu quality, access (water, vending machines), fundraising.		
			●	Not reported	36			Polices, menu quality, access (vending machines), attitudes, advertising, fundraising.		
			●	6 h	105	Policy, amount of time allocated, activity types, staff behavior, training and credentials	Space, safety	Policy, menu quality, meal schedule, food safety, staff behavior, training and credentials, access (water), curriculum, evaluation, advertising, fundraising		Close-ended questions with possible responses: Fully in place/partially in place/underdeveloped/not in place
			●	6 h	122	Policy, amount of time	Space, safety	Policy, menu quality, meal schedule,		Close-ended questions with possible

Table 1 (continued)

				training and credentials, curriculum		and credential, access (water), curriculum, evaluation, advertising, fundraising	Fully in place/partially in place/underdeveloped/not in place
●		40 min	88			Child involvement, menu quality, meal schedule, food safety, staff training, staff credentials, access (water), evaluation	Combination of open-ended and close-ended questions: Close ended questions possible responses: Yes/No, Likert scale
●		60 min	114	Amount of time allocated, activity types, staff training and credential, evaluation			Combination of open-ended and close-ended questions:  – Close-ended questions with possible responses: Yes/No, Likert scale
●		60 min	201	Policy, amount of time allocated		Policy, menu quality, meal schedule, access (water) evaluation, fundraising	Combination of open-ended and close-ended questions: Close-ended questions possible responses:  – Yes/No – Likert scale
●		Not reported	29			Policy, menu quality, food facility, staff behavior, training.	Uses best practice framework of criteria at the bronze, silver and gold levels as a way of scoring the program policy.
●		Not reported	36			Policy, child involvement, staff behavior, training, access (vending machine), curriculum, evaluation, fundraising.	Close-ended questions. Choose one response category from three categories arranged in hierarchical order
●	●	30 min	96	Policy, amount of time allocated, activity types, staff behavior, training and credential, curriculum, evaluation.	Space		Close ended questions with possible responses:  – Yes/No/Don't know – No/Partially/Yes
●		Not reported	11	Policy, amount of time allocated, activity types, staff training, curriculum		Policy, staff training, curriculum.	Choose one response category from several arranged in hierarchical order Uses best practice framework of criteria at the bronze, silver and gold levels as a way of scoring the program policy. Close-ended response option: choose the most appropriate statement.
●		Not reported	10	Policy, amount of time allocated, activity types, staff training, curriculum.		Policy, menu quality, curriculum.	Uses best practice framework of criteria at the bronze, silver and gold levels as a way of scoring the program policy.
●		Not reported	8	Policy, amount of time allocated, activity types, curriculum.			Uses best practice framework of criteria at the bronze, silver and gold levels as a way of scoring the program policy.
●		Not reported	18			Snack/beverages quality.	Open-ended questions (listing how many selections of each type of food and drink items available)
	●	Not reported	96	Policy, amount of time allocated, activity types, staff behavior, training and credentials, curriculum, evaluation	Equipment, safety, space	Policy, child involvement, menu quality, meal schedule, staff behavior, training and credentials, food safety, access (water, vending machines) curriculum, advertising, fundraising.	School policy statement is rated "0", "1" or "2".
	●	Not reported	160 (childcare) 123 (school)	Policy, child/parent involvement, amount of time allocated activity types, screen	Equipment, safety, space	Policy, menu quality, meal schedule, staff training, access (water), fundraising.	Combination of close- and open-ended questions. Close-ended questions with possible

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**Table 2**  
Summary of tools reporting psychometric properties.

Author (year) Tool name	Reliability			Validity		
	Type	Analysis	Findings	Type	Analysis	Findings
Ward et al. (2008) Bower et al. (2008) EPAO	Interobserver (concurrent)	For all items: Percent agreement For subscale: ICC <sup>a</sup> (one-way ANOVA)	Mean percent agreement was 87.26% for observation section and 79.29% for document review section ICC values ranged from 0.45 to 0.97	Construct Comparing EPAO subscales with mean activity level and % MVPA using OSRAP <sup>b</sup>	Pearson's correlation	Pearson's correlation: Strongest correlation between mean PA and %MVPA PA policy had weak correlation with estimate of PA ( $r = -0.076$ to 0.157) Reasonable face and content validity
Benjamin et al. (2007) NAP SACC	Test-retest (2 time over a 3 week. period)	Kappa coefficients & percent agreement	Test-retest: Kappa ranged from 0.07 to 1.00; interquartile ranged from 0.27 to 0.45%; agreement ranged from 34.3% to 100%	Face and content	Conducting a comprehensive literature and resource review	
	Inter-rater (concurrently using 50 triad and 9 dyads)	Kappa coefficients & percent agreement	Inter-rater: Kappa ranged from 0.20 to 1.00; interquartile ranged from 0.45 to 0.63 and percent agreement ranged from 52.6% to 100%	Construct Expert review from Jan to April 2004 Criterion Comparing each question from the NAP SACC to the EPAO data from 69 childcare centers Criterion For policy & practice items survey answers were compared with in-person interview with mirroring items For Practice & environment items survey answers to direct observation data For nutrition quality items survey answers were compared to a measurement tool created for this project.	Weighted kappa coefficients & percent agreement Percent agreement	Validity was reported to be established through the National expert review Kappa ranged from $-0.01$ to 0.79 & percent agreement ranged from 0 to 93.65% Percent agreement 39%–97% (62% item achieved $\geq 80\%$ )
Henderson (2011) Child Care Nutrition and Physical Activity Assessment Survey						
Falbe et al. (2011) WeIICCAT	Inter-rater (18 random documents coded by 2 raters independently)	ICC	For total Comprehensiveness and strength score ICC was 0.98 and 0.94 respectively For subscale ICC ranged from 0.84-0.99 respectively.	Construct Compared policy quality scores for Head Start centers to those of non-Head Start centers and centers accredited by the National Association For Education of Young Children	Simple <i>t</i> test	Comprehensiveness and strength scores were higher for Head Start centers than non-Head Start centers across most domains and higher for the National Association for Education of Young Children accredited centers than non-accredited centers across some domain
	Internal consistency	Cronbach's $\alpha$ coefficients	Cronbach's $\alpha$ ranged from = 0.53 to 0.83			
Brener et al. (2003) SHPP 2000	Test-retest (2 interviews) 1st interview was computer assisted 2nd interview field staff led Interview conducted 10 to 20 days apart	Kappa coefficients & Pearson's correlation	School level PE Kappa ranged from 51.4% to 80.7% Classroom PE kappa ranged from 51% to 74.4% Person correlations for both school and classroom level PE questions ranged from 0.39% to 0.67% Food service, kappa ranged from 36.6% to	Construct Only for the state and district level questionnaires (through a follow up telephone interview with a subsample of the original state and district level respondents)	Comparison between the questionnaire data and interview data	Interviews with the state and district level respondents indicated that overall the questionnaire produced valid data

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Table 2 (continued)

Author (year) Tool name	Reliability			Validity		
	Type	Analysis	Findings	Type	Analysis	Findings
Lounsbury et al. (2012) S-PAPA	Test-retest (measured 14 days apart)	Kappa, percent agreement, Phi and Chi square tests	88.5% and Pearson's correlation coefficient ranged from 0.45 to 0.75 <i>PE module</i> Kappa ranged from 0.14 to 0.99 and the first and second administration responses had significant $\chi^2$ association p values ranging from 0.001 to 0.04 with percent agreement ranging from 67% to 87% <i>Recess module</i> Kappa ranged from 0.33 to 0.81 and first and second administration responds had significant $\chi^2$ association p values ranging from <0.001 to 0.034 with percent agreement ranging from 71% to 97% For before, during and after school program kappa ranged from 0.31 to 0.84 and first and second administration responses had mostly significant $\chi^2$ association with P values ranging from <0.001 to 0.065 with percent agreement ranging from 61% to 87%	Content	Instrument review by content expert and PE teachers	A draft instrument was reviewed by a content expert, revision was made then the revised instrument was re-sent to the content expert and a third draft was prepared. This draft was sent to 4 PE teachers and based on their feedback a final fourth instrument was prepared resent to PE teachers and based on their feedback final instrument was completed.
Bullock et al. (2010) FoodBEAM	Inter-rater (for researcher to researcher (4 dyads) and researcher to non-researcher (5 dyads))	ICC	For both food and beverages researcher versus researcher and researcher versus non-researcher ICC ranged from 0.972 to 0.987	Convergent Comparing FoodBEAMS to the school environmental assessment tool (Samuels, 2008)	ICC scatterplot of EAT + FoodBEAMS versus percent adherence by venue to California state standards for beverages and food	ICC for beverages = 0.982 and for food = 0.975 and shows that the FoodBEAMS is a valid method for collecting this type of data.
Schwartz et al. (2009) WellSAT	Inter-rater (by pairs of researcher 1 in-state and 1 out-of-state)	ICC Cronbach's alpha	For total comprehensiveness and strength ICC = 0.82 For subscale scores were 0.70 For individual items ICC was 0.72. Cronbach's alpha ranged from 0.90 to 0.93			
Kim et al. (2010) CHLI	Inter-rater (4 sites with two interviews)	Percent agreement	93.0% school items & 84.9% afterschool items showed substantial to almost perfect agreement			
Ajja et al. (2012) HAAND	Inter-rater (concurrently)	Percent agreement kappa statistic	Percent agreement ranged from 85% to 100% across all items. Kappa statistics ranged from 0.73 to 1.00 for HAPI-PA (Healthy Afterschool Program Index-Physical activity) and 0.76 to 1.00 for HAPI-N (Healthy Afterschool Program Index-Nutrition)	Content	Items of HAAND tool were developed based on extensive literature review of the existing PA & nutrition environment quality rating, standards and policies from state and national organizations and input from expertise in childcare and afterschool field	Good content validity
				Construct Pedometer step counts were compared to the HAPI-PA scores Menu from observation day was compared to number of time FV Whole grains and sugar sweeten beverages reported on the HAPI-N	Means and standard deviation calculated and one-way ANOVA test used	HAPI-PA, $\uparrow$ pedometer steps were significantly associated with presence of a written policy related to PA, amount/quality of staff training use of PA curriculum and offering activity that appeal to both genders For HAPI-N, higher servings of FV and whole grains per week were significantly associated with the presence of a written policy regarding the nutritional quality of snacks Percent agreement = 37% to 100% PABAK = -0.06 to 1.00
Nathan et al. (2013). (SEAT)				Construct Principals' self-report using the SEAT was compared with scores from	Kappa/PABAK coefficients & percent agreement	

percent agreement, means and standard deviation, multi-level modeling and one-way ANOVA. The following tools reported the highest validity coefficients: the WellCCAT (Falbe et al., 2011), with centers known to have supportive environmental characteristics scoring significantly higher than centers with less supportive environments; the Child Care Nutrition and Physical Activity Assessment Survey (Henderson, 2011), with 62% of the items reporting  $\geq 80\%$  agreement between item scores and criterion measures such as in-person interviews, direct observations, and a newly-developed tool to assess menu items; and the HAAND tool (Ajja et al., 2012), with physical activity items having significant positive associations with pedometer step counts.

## Discussion

The purpose of this review was to examine the measurement properties of audit tools currently used to evaluate environmental characteristics at various settings caring for youth ( $\leq 18$  years). Fifty-three tools evaluating the physical activity and healthy eating environmental characteristics in a variety of youth care settings were included in this review. The findings from this review indicate that although a considerable number of tools have been developed over the past decade, relatively little work has been devoted to establishing their reliability and/or validity, with only 11 out of 53 tools having measurement property information reported.

This review highlights several key issues regarding the utility and the quality of the data collected by the audit tools identified. Several tools ( $n = 7$ ) were developed to assess a specific project or environmental interventions (Child Care Nutrition and Physical Activity Policies – Evaluation; School Health Policies and Practices Study (SHPPS), 2006a,b; Sim and Wright, 2000; Bullock et al., 2010) or to evaluate the validity of another pre-existing audit tool (Lytle et al., 2006). For example, the Policy Assessment Tool, the 2-Minute Program Assessment, and the Program Assessment Tools were all developed to assess the Out of School Nutrition and Physical Activity (OSNAP) intervention in the afterschool setting (Out of School Nutrition and Physical Activity Initiative (OSNAP), 2011). Another example is the Principal's Survey Tool (Lytle et al., 2006) which was developed as part of evaluating the Teens Eating for Energy and Nutrition at School (TEENS) intervention. As a result, the generalizability of such tools is limited to the projects/interventions that they were developed to evaluate and may therefore not provide accurate reflection of practice when used to assess alignment with national and state level physical activity and healthy eating environmental characteristic recommendations.

### Psychometric properties

#### Reliability

Inter-rater reliability was the most reported type of reliability. Assessing tool test–retest and internal consistency reliability is an essential step in establishing measurement properties in the early stages of audit tool development. It is especially important to establish this characteristic in self-assessment tools as it provides critical information about the stability of the item scores on multiple administrations (test–retest reliability) and the extent to which items in the tools all measure the same underlying construct (internal consistency reliability) (Sim and Wright, 2000). However, for observational audit tools, inter-rater reliability is most critical as it will confirm that individuals using the tools observe the same items. For instance, do multiple evaluators assign similar scores to items with respect to the presence or absence of environmental characteristics? An example might be “does the school have a written policy banning cafeteria from serving sugar-sweetened beverages?”

For continuous data, the intraclass correlation coefficient (ICC) is recognized as the most preferred analysis, whereas for ordinal/categorical data, the recommended analysis is kappa statistics (Rigby, 2000; Streiner and Norman, 2003). An ICC and kappa coefficient of

$\geq 0.7$  is considered an acceptable reliability coefficient (Fleiss et al., 1981; Cicchetti et al., 2006) while the use of Pearson's correlation coefficient ( $r$ ) is not recommended to assess test–retest reliability as correlations are considered a measure of association and not a measure of agreement (Chinapaw et al., 2010). In this review, only a single study reported using a Pearson's correlation coefficient ( $r$ ) to evaluate test–retest reliability (Brenner et al., 2003a). Overall, there are large variations in the reported reliability coefficients, with reliability coefficient values ranging from poor agreement (i.e.,  $\leq 0.2$ ) to almost perfect (0.8 to 1.00) for kappa while many of the items across the tools reviewed failed to reach the acceptable level for reported reliability (i.e., Kappa  $> 0.70$ ).

This review found that although the majority of the tools assessing the physical activity and/or healthy eating environment characteristics were designed to be used by staff/community members (i.e., self-assessment tools), only two studies (Kim et al., 2010; Bullock et al., 2010) evaluated the inter-rater reliability of the tool when used by different groups (i.e., among non-research affiliated staff/community members and/or when compared to research staff). The first study was conducted by Kim et al. (2010) to evaluate the reliability of the CHLI tool. They reported that the items in the audit tool showed substantial to almost perfect agreement between staff/community members. The second study was done by Bullock et al. (2010), to evaluate researcher-to-researcher and researcher-to-non-researcher inter-reliability of the FoodBEAMS tool. In this study, they reported perfect agreement between researchers as well as between researchers and non-researcher staff. The ability of the staff/community members to rate the environmental characteristics as accurately as researchers is an essential step in tool development for several reasons. Audit tools designed to evaluate the policy and practice environment characteristics are often definition-dense, with terminology that does not easily lend itself to use by community members. In addition, one cannot assume that establishing inter-rater reliability across researchers will necessarily translate to inter-rater reliability when used by staff/community members. Therefore, adequate training to intended users of these tools is required if such tools are to yield accurate data. Future research should focus on establishing accuracy of newly developed tools when used by intended audiences (i.e., staff/community members).

#### Validity

Establishing all types of validity (e.g., content, face, criterion, and construct) is an essential step in new tool development (Burton and Mazerolle, 2011). Construct validity is particularly important as it provides important details as to whether or not a tool actually measures the construct that it intends to measure. An important question is “do the items in the tool consistently follow a predicted pattern or theory?” (Lytle, 2009; McKinnon et al., 2009) An example of this type of validity would be settings which score higher in physical activity-promoting policies having a higher participant physical activity levels when an objective measurement is used, such as accelerometers/pedometer.

The use of Pearson's correlation coefficient ( $r$ ), ICC, percent agreement, scatter plots of interest differences versus means (i.e., visual inspection), and one-way ANOVA are considered acceptable analyses for reporting on the validity of continuous measures (Karras, 1997a). For ordinal continuous data, the use of Spearman's rank correlation coefficient ( $r_s$ ) is recommended and for categorical (ordered) data, weighted kappa statistics are often recommended (Karras, 1997b). When a tool's validity coefficients were reported, there were wide variations in the reported values across tool items within each tool, with many of the studies reporting that tools demonstrate good to acceptable validity coefficients, despite the fact that multiple items within those tools fail to reach acceptable coefficient values. Overall this review found that the majority of the studies evaluating measurement properties used appropriate terminology when reporting on the type of validity evaluated. However, only a single study (Henderson et al., 2011) reported criterion validity by using a follow-up interview with the site director who completed the original assessment as a

criterion comparison to evaluate the policy and practice items of the tool. The accurate use of terminology is of critical importance as misclassification of the type of measurement evaluated will impact the quality of the data collected.

In this review, apart from the study by Lounsbury et al. (2012) which only reported on content validity for the S-PAPA tool, all the other studies examined additional validity types such as construct or criterion validity to establish stronger measurement properties of the newly developed tools. When validity was tested, construct validity was the most often reported validity type, which is an essential measurement property to establish if audit tools are expected to be used to evaluate the environmental characteristics in relation to health outcomes (Lytle, 2009).

These elements, reliability and validity, are fundamental measurement properties necessary for the collection of accurate information on policy and practice environment characteristics of settings that serve youth. This review shows the lack of consistency when reporting on measurement properties of such tools, with 7 studies out of 11 reporting both validity and reliability properties of environment characteristic audit tools, and 4 studies reporting on either validity or reliability properties of such tools. For example, Kim et al. (2010), and Schwartz et al. (2009), reported only the reliability of the CHLI and the WellSAT tools, respectively. Henderson et al. (2011) reported on only the validity of their newly developed tool. Validity testing of newly developed tools is an important first step in establishing the measurement quality of newly developed tools prior to establishing tool reliability. However, this review indicates that, when measurement properties were tested, the focus was more on reliability testing than validity testing, with reliability reported more often than validity when assessing newly developed instruments, which is in line with current literature findings (McKinnon et al., 2009). Future studies, should address the cause for this apparent lack of validity reporting in the field.

#### Limitation

Despite our efforts to identify current environmental audit tools used in youth care setting, the authors understand that some tools could have been overlooked. In addition, as indicated in our review, many of the tools were developed for specific projects and were not intended for publication making their identification more difficult.

#### Recommendations regarding future audit tool development

Audit tools designed to evaluate the environmental characteristics of settings that care for children must demonstrate minimal acceptable levels of reliability and validity evidence. This is critical as information gathered from such tools is being used to inform policy makers' decisions regarding the impact or effectiveness of environmental characteristic interventions and to, in turn, formulate future strategies regarding the promotion of physical activity and healthy eating habits among youth. Saelens and Glanz (2009) put forward a set of guidelines for reporting on newly developed instruments. These guidelines include: (1) the rationale and justification for developing the tool and how it differs from existing tools, (2) the construct measured by the tool, (3) reliability and validity of the tool, (4) detailed protocols on how to use the tool, (5) scoring and scaling of the tool, (6) modifications made to the tool, (7) the setting, geographical area, and population or environments where the tool was used, and (8) ways to access the tool.

In the future, when developing new audit tools to assess the environmental characteristics, we recommend that the guidelines put forward by Saelens and Glanz (2009) be followed when evaluating new audit tools designed to measure environmental characteristics. In addition, we propose that when developing such audit tools, (1) greater efforts must be put towards evaluating inter-rater reliability between researchers and intended users of the tool (e.g., staff/community members, researchers); (2) establishment of construct validity should be given high priority; and (3) reliability and validity coefficient scores across items of newly developed tools should be reported.

#### Conclusion

Little attention has been given to establishing reliability and validity evidence of newly developed tools designed to assess physical activity and/or healthy eating environment characteristics in settings caring for youth. Future efforts should be directed towards establishing a strong measurement foundation for these important environment audit tools in order to maximize the understanding of the health-promoting potential of these critical developmental settings.

#### Conflict of interest statement

The authors declare that there are no conflicts of interests.

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