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Development and Testing of the Observational System for Recording Physical Activity in Children: Elementary School

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ABSTRACT

Purpose: This study describes the development and pilot testing of the Observational System for Recording Physical Activity–Elementary School (OSRAC–E) Version. **Method:** This system was developed to observe and document the levels and types of physical activity and physical and social contexts of physical activity in elementary school students during the school day. Interobserver agreement scores and summary data were calculated. **Results:** All categories had Kappa statistics greater than .80, with the exception of the activity initiator category. Interobserver agreement scores were 96% or greater. The OSRAC–E was shown to be a reliable observation system that allows researchers to assess physical activity behaviors, the contexts of those behaviors, and the effectiveness of physical activity interventions in the school environment. **Conclusion:** The OSRAC–E can yield data with high interobserver reliability and provide relatively extensive contextual information about the physical activity of students in elementary schools.

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Direct observation; elementary school; objectivity; physical activity

Although the rate of obesity has reached a plateau, prevalence remains high (Ogden, Carroll, Kit, & Flegal, 2014) and efforts to understand the development of overweight and obesity, especially in children, are still necessary. Although it is well accepted that poor diet and physical inactivity are the primary contributing factors leading to obesity (Koplan, Liverman, Kraak, & Committee on Prevention of Obesity in Children and Youth, 2005), the underlying factors related to these behaviors (genetic, physiological, social-cognitive, family and peer, and school and community) are still unknown (Pate et al., 2013). Most adults assume that children are active beings by nature, but researchers have found that even at early ages, inactive pursuits may outweigh active choices (McKenzie et al., 1997; Pate, McIver, Dowda, Brown, & Addy, 2008; Pate, Pfeiffer, Trost, Ziegler, & Dowda, 2004). Given that the overwhelming majority of elementary school-aged children attend public or private school classes for extended hours for most days of the year, the opportunity for children to engage in healthy physical activity during school is an especially important issue. Moreover, the prevalence of children and youth meeting the recommended levels of physical activity is low, and school-based physical activity is average at best (National Physical Activity Plan Alliance, 2014).

Physical activity research in children must consider the environments in which children are active. With schools playing an important role in delivering opportunities for children to be active, it is important to adequately assess physical activity in this setting and inform policymakers on what is working and what is not working. Whereas investigators have used proxy reports (parent and/or teacher) and accelerometry to measure physical activity in elementary school-age children, these two measurement tools lack specificity for describing the types of activities in which children participate during the school day and the contexts of those activities. Some researchers have used direct observation to evaluate specific active parts of the school day, such as physical education and recess periods (McKenzie, Marshall, Sallis, & Conway, 2000a, 2000b; Skala, Springer, Sharma, Hoelscher, & Kelder, 2012). The categories for these systems are specific to instruction (System for Observing Fitness Instruction Time [SOFIT] for physical education) or setting (System for Observing Play and Leisure Activity in Youth [SOPLAY] for outdoor play/recess) and therefore leave out a large chunk of the school experience for children. To our knowledge, no direct observational system allows researchers to observe children's activity across multiple school settings throughout the school day. Rich contextual information has been especially

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lacking outside of physical education and recess periods. Extensive contextual information about the physical and social circumstances in which activity occurs across the school day may be very important for describing and ultimately improving activity in the school environment (McKenzie & van der Mars, 2015; National Physical Activity Plan Alliance, 2014). The purpose of this study was to further develop direct observation systems (i.e., the Observational System for Recording Physical Activity – Elementary School-Preschool [OSRAC – P] and Observational System for Recording Physical Activity – Home [OSRAC – H]) that provide information on physical activity behaviors and the physical and social environmental contexts associated with those behaviors for elementary school-age children (Observational System for Recording Physical Activity – Elementary School [OSRAC – E]). Additionally, we performed pilot testing of the system to assess interrater agreement and provide preliminary findings. The OSRAC – E will provide researchers with a tool to collect unique information on physical activity in a wide variety of contexts within elementary schools.

Methods

System development

The OSRAC – E was created as an extension of the battery of OSRAC direct observation systems (OSRAC – P, Brown et al., 2006; OSRAC – H, McIver, Brown, Pfeiffer, Dowda, & Pate, 2009). Using the OSRAC – P as a guide, the OSRAC – E was developed with the goal of collecting physical activity information on the physical and social environmental contexts specific to elementary school settings. The OSRAC – P consists of eight categories with accompanying codes that describe physical activity behaviors (activity levels and behavioral topographies) and the environmental (locations, indoor contexts, outdoor contexts) and social (group compositions, activity initiators, prompts for activity) circumstances associated with those behaviors. While part of our goal was to keep certain categories consistent across the various OSRAC systems (physical activity levels, physical activity topographies, group compositions, activity initiators, prompts for activity), development of the OSRAC – E focused on creating new categories and accompanying codes that will be specific to common elementary school settings (e.g., classrooms, gyms, cafeterias). Researchers, including an education specialist, evaluated content validity through in-depth observation of classroom activities prior to the start of tool development. Once potential categories and codes had been determined, these codes were vetted through initial observation periods at schools to ensure completeness of capture for behaviors and settings.

Prior to any formal data collection, informal visits were conducted with several nonparticipating schools. During these visits, researchers observed normal classroom behaviors and circumstances and obtained classroom schedules to develop categories and codes that encompass the activities that take place throughout the entire school day. Based on these preliminary observations, an initial version of the OSRAC – E was developed for further evaluation and development prior to formal pilot testing.

The categories developed specific to the elementary version included: (a) physical settings, (b) instructional settings, and (c) contexts. The complete listing of all categories and codes is provided in the Appendix. These new categories reflected elementary school environmental settings such as cafeterias, libraries, classrooms, gyms, and sports fields. Instructional settings included contexts specific to school-day schedules or classroom activities, such as assemblies, changing classes, homerooms, recesses, and core classes (e.g., math, reading, science). The context category included codes for both indoor and outdoor activities and is used to describe the activities in which observed children participate such as academics, computers, games, playing in open spaces, and transitions.

All of the OSRAC systems operate using a focal child, momentary time-sampling procedure with a 5-s observation interval and 25-s recording interval pattern. For this study, observation periods were set at 20 min, thus yielding a total of 40 observation intervals during the 20-min observation period (i.e., 2 per minute). The length of the observation period can be modified to meet researchers' requirements. For example, some researchers may want to shorten or lengthen the observation interval based on their research question and resources. Observations were coded using Intman observation software on Dell Axim x51 handheld computers. In the OSRAC coding systems, because we were interested in estimates of the highest level of activity and related contextual conditions, the highest level of activity was coded for each 5-s observation interval and all accompanying information was recorded with reference to the highest activity level performed. The accompanying codes were recorded with physical activity level first, followed by the other categories in the order in which they are presented in the Appendix. Thus, a single number (code) was recorded for each category (i.e., physical activity level = 3, physical activity type = 17, physical activity setting = 4, etc.). The percentage of intervals coded as a given code (e.g., Physical Activity Levels 4 and 5) within any category could then be

evaluated. Intervals/epochs were not translated into time because the observation window was not the full 30 s, but the 5-s period of a 30-s block. All categories and codes are mutually exclusive, meaning that only one code per category was allowed for each 5-s observation interval.

Participants

To refine the observation system and conduct pilot testing, elementary schools (K–fifth grade) in two school districts in Central South Carolina were invited to participate in the study. Eight schools agreed to participate. The schools represented a range of socio-economic statuses. Across the eight schools, free/reduced school lunch averaged 39.6% with a range of 13% to 70% of the school populations. The average student population was 622. Racial/ethnic distributions were not reported at the school level. In each school, one classroom per grade (K–fifth grade) was randomly selected to participate, and all students in that classroom were recruited for participation. Two children in each grade at each school were randomly selected to participate from the sample of students ($n = 177$) who provided both written parental consent and child assent. The study was approved by the Institutional Review Board at the University of South Carolina.

At the first two schools (24 children), the initial version of the OSRAC–E was used during all observations. Based on the observers' experiences and research team discussions, a few modifications to the system were made prior to conducting additional pilot observations. The modifications included the addition or removal of categories and codes based on flow of observation, frequency of observation, and development of code definitions. For example, physical education was removed as a category and instructional setting was added as a category to include physical education and recess, along with core classes and other related arts, among others (see the Appendix). The final version of the OSRAC–E was used for all observations in the remaining six schools (71 children). Complete data, using the final version of the OSRAC–E were available on 71 children. Participants were 64% White, 30% Black, and 6% Other (Asian or Hispanic). Each grade was represented by 12 children, with the exception of second grade, for which 11 children were observed. Boys ($n = 39$) and girls ($n = 32$) were equally represented across the six grades.

Observation protocol

Observers spent 1 week at each school to conduct the observations. Similar to previously published OSRAC systems and given observer resources for this pilot study, each child was observed for four 20-min periods (total of 80 min), randomly assigned throughout 1 week at each school. The entire school day was available for selection of observation times. Data were collected throughout the school day to observe both high- and low-active periods. We purposefully oversampled physical education and recess periods to better capture opportunities to observe children being physically active during those school activities. Other class periods included core classes (math, science, language arts, social studies), related arts (foreign language, art, music, chorus, etc.), lunch or snack, and transition times. Observers integrated themselves into the classroom environment by visiting each class prior to conducting observations and by being in the classroom for several minutes prior to an observation period starting. Children did not know who was being observed at any given time. During each observation period, the observer would go wherever the class went including walking in the hallways, to all classes, and on the playground or gym.

The rationale for using 20-min periods was based on the classroom schedules of the participating elementary schools. Each class lasted about 45 min, and therefore, during each class period, two students within that class could be observed. This minimized interruption to the classrooms and allowed for observer transition between classes when needed. Observing 20-min blocks allowed us to observe behaviors adequately while enabling refinement of the system as needed.

Two trained observers collected all of the observation data for this study. Prior to data collection, the two observers were trained using a protocol developed by this research team (Brown et al., 2006). The data collectors reviewed the training manual, completed quizzes on the components, and completed approximately 5 hr of video observation and coding practice prior to live coding practice. Approximately 20 hr of live simultaneous coding practice, with discussion between observers initially and then without discussion, was performed prior to coding in the study schools. Training continued until the observers achieved interobserver agreement (IOA) of at least 80% in all categories (Brown et al., 2006).

The observers were seasoned observers and knew to place themselves in position to see and hear the target child but far enough away to not interfere with the behaviors. Observers noted reactivity to observer presence during observation sessions, but no sessions were deemed inappropriate for use in the analysis due to reactivity.

Interobserver agreement

There were 11,360 available observation intervals (i.e., 71 children × 20 min × 4 periods × 2 = 11,360). However,

some intervals did not have physical activity level (or other categories) coded due to changes in school schedule, self-care codes resulting in "don't know" for some categories, and/or missing a record interval due to device malfunction or observer inefficiency in entering codes. Removing these intervals resulted in a total of 11,076 intervals. To assess IOA, the two observers independently and simultaneously coded during 88 observation periods (i.e., 32% of the total number of observation intervals; 3,520 out of 11,076 total observation intervals). Reliability was estimated for each session and then averaged. IOA data were evaluated using both Cohen's Kappa statistic and percent agreement. Percent agreement was calculated in addition to Kappa because the distributions of the codes within some categories were variable, restricted, and not always equal, which is an important assumption when using Kappa statistics. Interval-by-interval agreement is presented based on the observation session, where the total number of agreements within each category is divided by the total number of agreements plus disagreements for that category and multiplied by 100 for a resultant percentage (see Table 1).

Data analysis

The percent of intervals coded within each category was determined. As with our previously published studies, subsequent analyses were conducted to describe and report the percentage of intervals coded as sedentary (i.e., 1-Stationary or Motionless and 2-Stationary with Limb or Trunk Movements), light physical activity (i.e., 3-Slow-Easy Movements), and moderate-to-vigorous physical activity (MVPA, i.e., 4-Moderate Movements and 5-Fast Movements) for specific physical and social environments (locations, settings, instructional settings, groups, initiators, and prompts). Moderate and vigorous movements were combined to be consistent with the OSRAC–P and OSRAC–H. Differences in physical activity levels during certain instructional settings (core classes, physical education periods, recesses) were examined by unadjusted one-way analysis of variance.

Results

Means, standard deviations, and ranges for Kappa and percentage of agreement for each of the nine observation categories are presented in Table 1. All of the Kappa statistics are greater than .80, with the exception of activity initiators, indicating adequate levels of IOA within and across observation periods. Furthermore, the interval-by-interval agreement values are 96% or greater, indicating a high level of agreement between observers for all observation categories. Kappa statistics could not be calculated for the prompts for physical activity category because of nonoccurrence.

The numbers of observations per code within each category are presented in Table 2. Only the codes within each category that were observed during 30 or more intervals are presented. In addition, the percentages of intervals within each code, categorized as sedentary (Activity Level 1 and 2), light physical activity (Activity Level 3), and MVPA (Activity Levels 4 and 5), are listed. It is important to note that some activity types (running, jumping continuously) are always coded as vigorous activity (Level 5). As expected, children exhibited many more intervals of MVPA while outdoors compared with the indoor locations. The overwhelming majority of observation intervals were spent in exclusively sedentary activities, including sitting and standing (84%). Very few

Table 1. Interobserver agreement scores for the pilot sample.[a]

		Overall mean	Standard deviation	Minimum	Maximum
ACT LEVEL	Kappa	.90	.193	.80	.95
	A/(A + D)	98.0%	3.11%	96.6%	99.2%
ACT TYPE	Kappa	.98	.047	.97	.99
	A/(A + D)	99.3%	1.51%	98.5%	99.6%
LOCATION	Kappa	.95	.099	.83	1.00
	A/(A + D)	99.6%	1.50%	98.8%	100.0%
SETTING	Kappa	.92	.127	.64	1.00
	A/(A + D)	99.7%	0.94%	99.4%	100.0%
INSTRUCTIONAL	Kappa	.97	.062	.94	.99
	A/(A + D)	99.6%	1.05%	99.4%	99.8%
CONTEXT	Kappa	.93	.136	.83	.99
	A/(A + D)	96.9%	6.60%	88.8%	99.4%
INITIATOR	Kappa	.76	.092	.00	1.00
	A/(A + D)	99.1%	3.51%	95.6%	100.0%
GROUP COMP	Kappa	.80	.282	.55	.96
	A/(A + D)	98.5%	4.22%	95.4%	99.6%
PROMPTS	Kappa	—	—	—	—
	A/(A + D)	99.7%	1.19%	98.4%	100.0%

Note. A = agreement; D = disagreement.
[a] 88 observation periods and a total of 11,076 observation intervals.

Table 2 Number of intervals observed for each category and the percent of intervals coded as sedentary, light physical activity, and MVPA for each code.

Observed categories	Observed codes	Observed intervals	Sedentary (Levels 1–2)	Light (Level 3)	MVPA (Levels 4–5)
			Count of intervals by activity levels		
Primary Locations	Inside	9,958	9,056	599	303
	Outside	442	220	129	93
	Transition	685	350	309	26
			Percent of intervals by activity levels		
Physical Activity Types	Sit or Squat	7,472	100	0	0
	Lie Down	265	100	0	0
	Stand	1,867	100	0	0
	Walk	971	0	96	4
	Run	219	0	0	100
	Jump or Skip	110	1	25	74
	Climb	30	7	20	73
	Dance	36	42	44	14
	Throw	74	0	32	68
Physical Setting	Cafeteria	431	90	10	0
	Classroom	7,149	96	4	0
	Gym	1,969	71	14	15
	Hallway	401	37	58	5
	Library	96	95	5	0
	Multipurpose	82	94	6	0
	Playground	348	50	29	21
	Sports Field	104	42	35	23
	Other Inside Area	139	95	4	1
	Other Outside Area	37	89	11	0
Instructional Setting	Art	192	94	5	1
	Assembly	41	100	0	0
	Before School	164	81	19	0
	Change Classes	689	52	44	4
	Computer	307	99	1	0
	Core Class	4,501	95	4	1
	Homeroom	372	95	5	0
	Lunch	355	91	8	1
	Media Arts	95	96	4	0
	Music	620	98	2	0
	Physical Education	1,952	70	14	15
	Recess	612	64	21	14
	Other Related Arts	536	97	3	0
	Other	609	96	3	1
Activity Context	Academics	5,347	98	2	0
	Ball/Object	141	33	34	33
	Class Business	1,529	95	4	1
	Computer	531	99	1	0
	Fixed Equipment	119	56	21	23
	Games	311	61	19	20
	Gross Motor	478	34	28	38
	Open Space	166	37	40	23
	Rest	118	100	0	0
	Self-Care	48	71	23	1
	Snacks	376	92	8	0
	Transition	824	75	22	3
	TV/Videos	143	99	1	0
	Other	229	89	11	0
Group Composition	Solitary	41	44	44	12
	Adult Present	10,230	88	8	3
	With Peers	813	69	21	10
Activity Initiator	Adult	10,173	8,950	889	334
	Child	912	676	148	88

Note. MVPA = moderate-to-vigorous physical activity.

intervals were spent in light activity or MVPA. With respect to physical settings, observations of the sports fields or playgrounds had higher percentages of MVPA (23% and 21%, respectively) than other physical settings. Core classes, related arts periods, and homerooms were largely sedentary in nature, while changing classes, the before-school period, physical education periods, and recesses generally included light activity. During physical education periods specifically, 15% of intervals were observed in MVPA, 14% in light activity, and 70% in sedentary behaviors. During recesses, 14% of intervals were observed in MVPA, 21% in light activity, and 64% in sedentary behaviors.

Table 3 presents the differences in physical activity levels during three specific instructional settings: classrooms, physical education periods, and outdoor recesses.

Table 3. Mean (*SD*) percent of intervals coded as sedentary, light physical activity, and MVPA for select school instructional settings and results of analysis of variance.

	Mean (*SD*)	*F* value	*p*
Classroom			
Sedentary	95.8 (4.0)	1.51	.20
Light physical activity	3.7 (3.3)	1.35	.26
MVPA	0.2 (0.9)	4.04	.003
Physical Education Class			
Sedentary	70.8 (17.9)	0.88	.50
Light physical activity	13.8 (10.3)	1.09	.38
MVPA	15.3 (13.1)	0.70	.63
Recess/Playground			
Sedentary	65.9 (26.3)	0.56	.73
Light physical activity	23.0 (16.4)	0.24	.94
MVPA	16.2 (22.5)	0.45	.81

Note. MVPA = moderate-to-vigorous physical activity.

Results indicated a significant difference in the percent of intervals of MVPA during classroom time.

Discussion

Similar to two previous versions of the OSRAC (i.e., OSRAC–P, Brown et al., 2006; OSRAC–H, McIver et al., 2009), we demonstrated that the OSRAC–E can be employed reliably (i.e., high IOA scores) with children in common elementary school settings. In addition to recording systematic ratings of children's physical activity intensities (e.g., sedentary, light, moderate to vigorous) and the topography of those activity behaviors (e.g., run, walk, sit, stand), well-trained observers also can collect and catalog a rich array of concurrent contextual information including: (a) physical settings, (b) instructional settings, (c) immediate activity contexts, (d) activity initiators, (e) immediate group compositions, and (f) prompts related to activity. These direct observational recordings can provide researchers with detailed contextual information regarding children's physical activity in elementary schools. This type of observational system may augment other methods, such as accelerometry and global teacher ratings of children's physical activity, in school settings and activities. In addition, the system may be used as a primary outcome or as a process evaluation measure to assess implementation of environmental interventions to enhance children's physical activity.

Comparisons to other existing direct observation systems

There are key differences between the OSRAC–E and previous direct observation systems. SOFIT and SOPLAY are great instruments for observation of physical activity in very specific settings and for group-level observations (McKenzie et al., 2000a, 2000b; Skala et al., 2012). The categories are specific to instruction (SOFIT for physical education; McKenzie et al., 2000b) or setting (SOPLAY for outdoor play/recess; McKenzie et al., 2000a) and therefore leave out a large chunk of the school experience for children. These instruments are also not intended to be focal child systems (like the OSRAC–E) and generally use group-based observations by observing multiple children within a single observation window or scanning the setting to document the activity of children within areas during the observation window. The OSRAC–E expands upon previous direct observation instruments by giving researchers the ability to observe children in any setting within the school and to document both the instructional context and environmental context of the activity. The OSRAC–E also captures the intensity level of physical activity and the type, rather than grouping the definitions together, thereby allowing researchers more fine-grained information about what the child is doing, not just the intensity level and type combined. The OSRAC–E allows researchers to capture the behavior *and* the context associated with the behavior, which is important as schools become more adaptive in adding physical activity to nontraditional settings such as classroom activity breaks, physically active instruction, and open classrooms. As schools move toward more alternative teaching approaches, the OSRAC–E will allow researchers to better assess the physical activity that might occur in any school setting.

Our pilot study provides estimates of elementary school-age children's physical activity in common school contexts. As anticipated, children were sedentary much of the school day and were more physically active only in specific settings and activities, such as gyms and outdoor recess periods. Nevertheless, even in those settings, in which opportunities for physical activity are greatest, a low percentage of observed intervals were MVPA (i.e., 23% for sports fields, 21% for playgrounds, and 15% for physical education classes). In addition, our findings indicate that although schools are potential important venues for physical activity interventions, school staff rarely encouraged children to be physically active (i.e., no prompts to increase activity were observed) and provided very few opportunities for MVPA throughout the school day (i.e., low levels of MVPA during core classes, related arts periods, and homerooms).

Implications for practitioners and researchers

A clear implication of our pilot study is that, similar to the findings of studies on preschool children (Pate et al., 2008), elementary school children are sedentary most of the day while in school. The American Heart Association recommends that at least 50% of time in physical

education classes is spent in MVPA (Pate et al., 2006). For that reason, physical education teachers may want to focus more time on activities that promote MVPA, in addition to emphasizing motor skills development. In addition to the traditional activity targets, teachers and administrators should continue to evaluate potential opportunities to promote and encourage elementary school-age children's physical activity throughout the school day. Specifically, school personnel could employ high-interest and short but intensive MVPA activities (e.g., Take 10 activities and energizers, Mahar et al., 2006; Stewart, Dennison, Kohl, & Doyle, 2004) to enhance children's daily physical activity during class time. We believe that school personnel "ought" (in the philosophical sense) to be proactive and systematic in planning and implementing short MVPA breaks throughout school schedules. The benefits of activity breaks for elementary school-age children await further replication and careful examination for effectiveness by physical activity researchers who are interested in arranging additional physical activity throughout the school schedule at appropriate times of the day.

Limitations

As a pilot study to develop a new direct observation system and evaluate IOA, our study has limitations that need to be acknowledged. Our sample was one of convenience, which may limit generalizability. We recognize the sampling throughout the school day, although systematic, was limited to common elementary school contexts and to a limited number of children. Obviously, sampling across more schools, time periods, days, and children should result in more representative estimates of children's physical activity than those derived from our pilot study. In addition, our study was not a validation study in which OSRAC–E was correlated with other measures of physical activity. That type of careful examination awaits future replications of the observational system with other measures such as accelerometry and teacher impressions of physical activity. Given our observation protocol of recording the highest level of activity in the 5-s window, these percentages could be overestimates of activity. The system is flexible, however, and researchers can adapt the protocol to fit their research needs by, for example, changing the observation protocol to observe the activity of the longest duration during the observation period. Finally, given the resources in time and training required to become reliable with the OSRAC–E and its sister observational tools, the direct observational protocol is limited to researchers who have significant resources to carefully and systematically study children's physical activity in "real-world" contexts. The careful training of observers, as documented in this study, will protect against observer bias, but it is worth noting that there is the potential for reduced generalizability when a limited numbers of observers are employed.

What does this article add?

We believe that the OSRAC–E provides researchers with a reliable and useful direct observation measure for their "toolbox." The OSRAC–E is well suited to assist investigators in collecting and cataloging a rich array of contextual factors related to elementary school children's physical activity. In addition, it provides reliable information that may be used with other types of measures (e.g., accelerometry, interviews, global rating scales) to obtain multimethod and multisource information about children's physical activity in day-to-day "real-world" contexts. Nevertheless, as mentioned in the Limitations section, direct observation is costly in terms of extensive initial training and periodic booster training is often needed to establish and maintain IOA throughout multiple observations and observers as well as across time. In addition, well-trained observers must maintain a sampling protocol that captures children's physical activity throughout relevant periods of investigation. Although costly to employ, direct observation of children's physical activity continues to prove useful as a method for describing physical activity in complex settings such as preschools, schools, and homes. Moreover, direct observations such as OSRAC–E can be used to evaluate program-, classroom-, and child-level responses to physical activity interventions. Additional investigations of OSRAC–E and its other direct observation systems (i.e., OSRAC–P, OSRAC–H) by other independent research teams will be needed to better establish the usefulness of the measurement systems.

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Appendix

Observational categories, accompanying codes, and brief descriptions for the Observational System for Recording Physical Activity in Children–Elementary Version (OSRAC–E)

Activity level codes	Brief description
1-Stationary	Stationary or motionless with no major limb movement or major joint movements (e.g., sleeping, standing, riding passively in a wagon)
2-Limbs	Stationary with easy movement of limb(s) or trunk without translocation (e.g., standing up, holding a moderately heavy object, hanging off of bars)
3-Slow-Easy	Translocation at a slow and easy pace (e.g., walking with translocation of both feet, slow and easy cycling, swinging without assistance and without leg kicks)
4-Moderate	Translocation at a moderate pace (e.g., walking uphill, two repetitions of skipping or jumping, climbing on monkey bars, hanging from bar with legs swinging)
5-Fast	Translocation at a fast or very fast pace (e.g., running, walking upstairs, three repetitions of skipping or jumping, translocation across monkey bars with hands while hanging)

Activity type codes	Brief description
Climb	Climbing, hanging
Crawl	Crawling
Dance	Dancing, expressive movement
Jump/Skip	Jumping, skipping, hopping, galloping
Lie Down	Lying down
Pull/Push	Pulling or pushing an object or child
R & T	Rough and tumble play, wrestling, tumbling
Ride	Cycling, skateboarding, roller skating, scooter
Rock	Rocking on a teeter totter or rocking horse
Roll	Rolling
Run	Running
Sit/Squat	Sitting, squatting, kneeling
Stand	Standing
Swim	Swimming or playing in a pool
Swing	Swinging on a swing
Throw	Throwing, kicking, catching
Walk	Walking, marching
Other	Other—record a note of the physical activity type for the interval on the observer form

(*continued*)

Activity type codes	Brief description
Climb	Climbing, hanging
Crawl	Crawling
Dance	Dancing, expressive movement
Jump/Skip	Jumping, skipping, hopping, galloping
Lie Down	Lying down
Pull/Push	Pulling or pushing an object or child
R & T	Rough and tumble play, wrestling, tumbling
Ride	Cycling, skateboarding, roller skating, scooter
Rock	Rocking on a teeter totter or rocking horse
Roll	Rolling
Run	Running
Sit/Squat	Sitting, squatting, kneeling
Stand	Standing
Swim	Swimming or playing in a pool
Swing	Swinging on a swing
Throw	Throwing, kicking, catching
Walk	Walking, marching
Other	Other—record a note of the physical activity type for the interval on the observer form

Location codes	Brief description
Inside	Inside the school
Outside	Outside the school
Transition	Transition between inside and outside areas

Physical setting codes	Brief description
Cafeteria	In the cafeteria
Classroom	In the classroom, including general classrooms, art and music rooms, and other related arts rooms not otherwise covered
Gym	In the gymnasium
Hallway	In the halls or walkways interior or exterior to the classroom buildings
Library	In the library
Multipurpose	In the multipurpose room (e.g. auditorium, dance studio, common area)
Playground	On the playground
Sports Field	On a sports field
Other Inside	In an inside area not otherwise specified
Other Outside	In an outside area not otherwise specified

Instructional setting codes	Brief description
Art	In art class
Assembly	In an assembly or other gathering of students (special program)
Before School	Before school starts
Computer	In a computer class or lab
Core Class	In core classes including language arts, science, social studies, math, etc.
Dance	In dance class
Lunch	At lunch or in another eating activity (snack, party, etc.)
Media Arts	In Media Center activities
Music	In a music class
PE	In a physical education class
Recess	In a recess period
Other Related Arts	In other related arts including languages, special reading/writing programs
Other	In other instructional setting not otherwise specified

Activity context codes	Brief description
Academics	Engaged in academic-related activities including classes and related arts
Ball/Object	Engaging in activities with objects used for gross motor activities (e.g., balls, throwing toys, jump ropes)
Class Business	Engaged in class business or nonacademic activities, free-time activities
Computer	Engaged in computer use for entertainment or educational activities
Fixed	Engaging in activity on fixed playground equipment (swing set, playhouse, tree house)
Game	Participating in a game with rules: tag games, basketball, soccer, board games
Gross Motor	Engaged in gross motor activities
Open Space	Being in an open outdoor space and not involved in a specific activity
Rest	Engaged in resting or nap time
Sandbox	Engaged in activities in the sandbox or other designated digging area
Self-Care	Engaged in self-care activities (restroom, tying shoes, changing clothes, etc.)
Snacks	Preparing, eating, or cleaning up food during lunch or snacks
Sociodramatic	Engaging in activities with materials and props for pretend play or make-believe roles
Teacher-Arranged	Engaging in a formal gross motor activity that has been planned and arranged and is led by an adult
Time-Out	Child is placed in time-out for disciplinary reasons
Transition	Transition between activities
TV/Video	Watching TV or a video on a TV
Wheels	Riding or using push toys with wheels (e.g., bicycles, scooters, skateboards)
Other	Other context not otherwise specified

Activity initiator codes	Brief description
Adult	The activity in which the focal child is involved was directed by an adult.
Child	The activity in which the focal child is involved was selected by a child.

Group composition codes	Brief description
Solitary	Engaging in a solitary activity and not in proximity to peers or adults
1-1 Adult	Engaging in an activity with or in proximity to only an adult
1-1 Peer	Engaging in an activity with or in proximity to a peer
Group Adult	Engaging in an activity with or in proximity to peers and an adult
Group Child	Engaging in an activity with or in proximity to peers without an adult

Prompts-for-activity codes	Brief description
None	Adults or peers did not explicitly prompt the focal child to increase or decrease physical activity or a prompt is unrelated to physical activity.
TP-I	Adult explicitly prompted the focal child to engage in or maintain physical activity.
TP-D	Adult explicitly prompted the focal child to stop or decrease physical activity.
PP-I	Peer explicitly prompted the focal child to engage in or maintain physical activity.
PP-D	Peer explicitly prompted the focal child to stop or decrease physical activity.