

# BEACHES

## Behaviors of Eating and Activity for Children's Health: Evaluation System

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### DESCRIPTION AND CODING CONVENTIONS

The BEACHES system was used to observe and code physical activity and eating behaviors for the research project, Social Learning of Diet and Physical Activity in Children, funded by the Heart, Lung, and Blood Division of National Institutes of Health from 1986-1991 (Philip R. Nader, M.D., Principal Investigator).

Additional information about BEACHES may be found in the following publications:

- McKenzie, T. L., Sallis, J. F., Patterson, T. L., Elder, J. P., Berry, C. C., Rupp, J. W., Atkins, C. J., Buono, M. J., & Nader, P. R. (1991). BEACHES: An observational system for assessing children's eating and physical activity behaviors and associated events. Journal of Applied Behavior Analysis, *24*, 141-151.
- McKenzie, T. L., Sallis, J. F., Nader, P. R., Broyles, S. L., & Nelson, J. A. (1992). Anglo- and Mexican - American Preschoolers at Home and at Recess: Activity Patterns and Environmental Influences. Journal of Behavioral and Developmental Pediatrics, *13*, 173-180.
- Sallis, J. F., Nader, P. R., Broyles, S. L., Elder, J. P., Berry, C. C., McKenzie, T. L., & Nelson, J. A. (1993). Correlates of physical activity at home in Mexican-American and Anglo-American children. Health Psychology, *12*, 390-398.
- McKenzie, T. L., Sallis, J. F., Elder, J. P., Broyles, S. L., Berry, C. C., Hoy, P. L., Nader, P. R., & Zive, M. (1997). Physical activity levels and prompts in young children at school recess: A two-year study of a bi-ethnic sample. Research Quarterly for Exercise and Sport, *68*, 195-202.
- Elder, J. P., Broyles, S. L., McKenzie, T. L., Sallis, J. F., Berry, C. C., Davis, T. B., Hoy, P. L., & Nader, P. R. (1998). Direct home observations of the prompting of physical activity in sedentary and active Mexican- and Anglo-American Children. Journal of Developmental and Behavioral Pediatrics, *19*, 26-30.

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## **BEACHES: A Brief Description**

(Behaviors of Eating and Activity for Children's Health: Evaluation System)

The San Diego BEACHES is a comprehensive direct observation system designed to simultaneously code the physical activity and eating behaviors of children and related environmental factors. It can be used at home, at school, and in any other settings that a targeted child might go. The system was developed from a behavior analytic (operant psychology/social learning theory) viewpoint and includes coding for 10 separate categories.

Observers sequentially focus on the target child for 25 seconds and then take up to 35 seconds to enter data codes into a lap-held computer (Tandy Model 102, available from Radio Shack). The computer paces both the observation and recording periods and it prompts observers to enter appropriate codes.

Selected environmental factors (such as the presence of others, the availability of food, and whether or not the child is watching television) and the child's physical activity level, eating behavior, physical location, and are coded each interval. Additional codes are entered whenever a physical activity or eating behavior is prompted or consequated during the interval. Interactor describes who was involved in a food or physical activity prompt or consequence. Antecedent identifies the type of prompt provided; prompted event identifies which child physical activity or eating event is prompted; and child response identifies whether or not the child complied with the prompt. Consequences identifies the type of controlling factor related to any consequated physical activity or eating behavior, and consequated event specifies the type of behavior consequated.

Child activity, location, and environment are scored using momentary time sampling methods; that is, codes are entered to describe events related to these three categories as they are occurring at the end of the observe interval. The other seven categories are scored using partial interval time-sampling; that is, the events of interest are coded if they occur at any time during the observe interval.

Child physical activity is coded into five mutually exclusive categories that provide for a continuum of all types of activity. Interobserver agreement (reliability) scores for physical activity are extremely high because body position (lying down, sitting, standing, and walking) is the determining factor for four of the categories. Only for category five (very active) do observers have to make fine discriminations.

## DESCRIPTION OF CATEGORIES

### **1.0 ENVIRONMENT**

Identifies pertinent environmental conditions present at the end of the interval. In addition to indicating who is present, codes are entered if food is accessible to the child (i.e., visible, attainable, and within 3 feet of the child) and whether or not the child watches television.

### **2.0 PHYSICAL LOCATION**

Identifies the location of the child at the end of the interval.

### **3.0 ACTIVITY LEVEL**

Provides an estimate of the intensity of the child's physical activity. Codes 1 to 4 (lying down, sitting, standing, walking) describe the body position of the child and code 5 (very active) describes when the child is expending more energy than he/she would during ordinary walking. For example, code 5 (very active) would be used to indicate the child is wrestling with a peer (even though he is lying on his back) or pedaling a moving tricycle or stationary bike (even though sitting).

### **4.0 EATING BEHAVIOR**

Identifies whether or not the child ingests food during the interval.

### **5.0 INTERACTOR.**

Identifies persons that participate with the child in a physical or verbal exchange that is related to physical activity or eating.

### **6.0 ANTECEDENTS**

Identifies antecedent stimuli that are related to increasing or decreasing the child's eating or physical activity. Included are (1) physical (e.g., offerings) and verbal (e.g., "Eat your spinach.") prompts, (2) imitative prompts (i.e., the interactor behaves in a manner to influence the child to engage in similar physical activity or eating behavior), and (3) child requests.

## **7.0 PROMPTED EVENT**

Identifies the eating or physical activity behavior that was prompted. Low intensity activities include those within physical activity levels 1, 2, and 3, and high intensity activities include those within levels 4 and 5. However, prompts related to locomotor activities (e.g., walking, running, hopping, skipping, galloping, chasing, fleeing, dodging, and crawling), as well as manipulative (e.g., throwing, catching, kicking, punting, dribbling, volleying, and striking) and non-manipulative activities (balancing, rolling, twisting, hanging, jumping) that involve gross motor movement are coded as high intensity activities.

## **8.0 CHILD RESPONSE TO PROMPT**

Describes the child's response to the prompt. The child may comply, refuse, or not respond within the interval.

## **9.0 CONSEQUENCES**

Identifies the physical and verbal consequential stimuli that are associated with increased or decreased eating and physical activity. Identified reinforcers or punishers may be contingent on the behavior during the interval or are stated that they will be contingent upon compliance or refusal (e.g., Finish your lunch or you won't get your popsicle for dinner.").

## **10.0 CONSEQUATED EVENT**

Identifies the type of eating or physical activity behavior that was consequated.

## **BEACHES: CODING CONVENTIONS**

During each observation minute, the data collector observes the target child for 25 seconds and then takes up to 35 seconds to record codes into the computer. A combination of momentary and partial time sampling is used.

### **CATEGORIES 1.0, 2.0, 3.0**

Use momentary time sampling. Code events only as they are occurring at the end of the observe interval.

If relevant, enter multiple codes for Environment, but enter only single codes for Activity Level and Location.

### **CATEGORIES 4.0 to 10.0**

Use partial interval time sampling. That is, code an event if it occurs at any time during the observe interval.

### **1.0 ENVIRONMENT**

ENVIRONMENT (1.0) is coded first and it is the only category for which multiple entries may be made. Environment is also the only category that requires that the 'enter' key be pressed to enter the codes.

Code each possible category that is part of the child's environment at the time of the record signal.

Specific persons (2-7) are coded to be part of the environment only if they are proximally located to the target child (i.e., within 25 feet) and within the designated boundaries of the environment. Observers should determine the boundaries of the environment before beginning data collection. Look for natural breaks in play, work, and eating areas that are separated by walls and shrubbery.

-6 (Teacher). In the school setting, code for any paid or volunteer staff member, including regular classroom teachers, specialists, and aides. Visitors and parents of children other than the target child are coded as "other adults" (1.7).

-8 (Food available). Code if any type of food is accessible to the child (i.e., visible, attainable, and within three feet of the child). In situations where food may be visible, but there are strict school or parental rules preventing it being eaten do not code food available. For example, food wrapped in plastic on a preschooler's table is visible but is not accessible (until the signal), therefore do not code it as "food available". Additionally, a child carrying an unopened bag of potato chips or can of soda is not coded as "food available". Food refers to all food suitable for human consumption, even though it may be designated for an animal or a person other than the target child. Spoiled or rotting food is not coded. Uncooked ingredients or foodstuffs in preparation that are not usually consumed (e.g., dough, cake mix) are not coded as food available.

-9 (Views tv). Code if a television or VCR in the child's environment is turned on and the child is watching it. Do not code for a child interacting with a computer or video game.

## **2.0 PHYSICAL LOCATION**

Code where the child is located at the signal.

-1 (Inside home). Child is within the walls of the home.

-2 (Outside home). Child is outside of home, but within localized home boundaries (e.g., yard, stairway, garage)

-3 (Outside general). Child is beyond the natural confines of localized home boundaries, but is not in a public playspace (e.g., is on the street or sidewalk; in a field).

-4 (Playground/playspace). Child is within designated boundaries of a formalized play area. The area may be publically or privately owned, but cannot be within the child's yard. A playspace usually includes formalized play equipment.

-5 (Inside school). Child is within the school walls (e.g., in hallway or classroom) and not within a room designated solely as the gymnasium/playspace (8) or a cafeteria (6). Code "inside school" rather than "cafeteria" when food is served in the classroom.

-6 (Cafeteria).Code "cafeteria" only when the child is in a schoolroom designated solely as an eating area. This room could later become a "school playspace/gymnasium" (8), but not a classroom.

-8 (School playspace) may include either a designated outdoor or indoor (gymnasium/multipurpose) area, but cannot be a classroom.

### 3.0 ACTIVITY LEVEL

Code the activity level that the child is engaged in at the signal.

Codes 1-4, code for the body position of the child only if he/she is not expending more energy than that required for an ordinary walk.

Code 5 (Very active) for any activity in which the child is expending more energy than he/she would during ordinary walking; do not consider body position only. For example, code 5 (Very active) if the child is wrestling with a peer (even though he is lying on his back) or pedaling a moving tricycle or stationary bike (even though sitting).

When the child is in transition from one category to another, enter the code for the higher category. For example, code '2' (sitting) if at the observation signal the child is partially lying down and partially sitting up; code '3' (standing) if the child is getting up from either sitting or lying down.

- Sample activity codes:

kneeling (weight on knees only)= standing)

kneeling (weight on knees and buttocks= sitting)

inactive "on all fours"=standing

seated swinging (arms producing no momentum)=sitting

seated swinging (arms producing momentum)=very active

carrying, pushing, pulling objects (obviously struggling)=very active

Remember that entries for all **environment (1.0)**, **physical location (2.0)**, and **activity level (3.0)** categories depend upon events occurring only at the end of the observe interval.

#### **4.0 EATING BEHAVIOR**

Code 2 (ingests food) only if the child puts food into mouth any time during interval.

Do not code for food already in the child's mouth or for food that the child removes from his/her mouth and re-inserts it

Code for the ingestion of medicine and gum, but not for water.

#### **5.0 INTERACTOR.**

For an interactor to be coded he/she must participate during the observe interval in a physical or verbal exchange that is related to physical activity or eating. (Playing an active game with a child would be coded; however, the act of eating simultaneously with a child would not be-- unless during the interval there is an interaction about food.)

For INTERACTOR (5.0) only a single entry can be made. This entry refers to the person associated with the ANTECEDENT (6.0) or CONSEQUENCE (9.0).

Code INTERACTOR only when there is an ANTECEDENT (6.0) or CONSEQUENCE (9.0) coded.

-If there is more than one interactor, code only the first one.

-It is possible for an interactor to be coded even though that person is not coded as part of the environment.

If a child makes a request of a person (6.5), code that person as the interactor.

Television is not part of the Interactor category. Thus, television is not coded as providing prompts or consequences.

Code an interaction (prompt or consequence, such as praise) directed about the target child and heard by him/her, as long as the interaction was related to increasing or decreasing the child's food or activity level. Code the person making this interaction as the interactor (5.0).



## 6.0 ANTECEDENTS

Antecedents refer to instances of prompting, imitative modeling, and child requests that relate to either eating or physical activity. The event (food or activity) associated with the antecedent is coded in category 7.0.

### prompts

Include both physical (e.g., offerings, such as presenting the child food or a bicycle) and verbal prompts related increasing (or doing) and decreasing physical activity and eating. (For example, code "Go outside and play." as a prompt to increase physical activity).

. Do not code instructional prompts that relate only to the topography of a skill (e.g., "In batting, swing level and follow through.").

In the instance of a father stating, "Let's go for a walk", code a prompt to increase high intensity activity with the father being the interactor. However, following the initial prompt the father and TC do walk together (e.g., for 10 minutes) code the father as part of the environment only (for each interval observed), unless a subsequent prompt occurs.

When an observe interval begins while TC is engaged reciprocally in active play with another person (e.g., during wrestling, tag, and chase), it may be difficult to determine who initiated the prompt. In these instances code the non-target person as the prompter (rather than a child request for activity)

-Prompts to increase (6.2) refer not only to increase a behavior, but also to do the prompted event.

Do not code verbal prompts if you don't hear them clearly. (Listen carefully and keep up with target child.)

Dinner bells are prompts to increase food, not prompts to increase low intensity activity. Do not code school bells.

Prompts with the major emphasis on eating, even if preceded by a directive for some activity, are coded as prompts for food (7.4) (E.g., "Come in and eat.", "Come inside, your plate is served.", and "Sit down and eat.". On the other hand when the major emphasis is related to physical activity an activity prompt should be coded. For example, "Stop all that running around and eat your hot dog." is be coded as a prompt to decrease high intensity activity.

#### provides imitative model (4)

An interactor behaves in a manner to influence the child to engage in a similar physical activity or eating behavior (i.e., tries to get the child to imitate his/her own behavior)

Code only if attention is drawn to the behavior by a verbal prompt.

Eating-- e.g., "Watch me eat this great spinach.....yum, yum, good"

Activity--e.g., while on equipment says, "See how much fun playing on this swing is."

#### child requests (5)

Code instances when the child asks or prompts others to allow him/her to have food or to engage in a physical activity.

This system permits the coding of a child requesting an activity of less intensity but not for requesting less food.

### **6.0 and 9.0 ANTECEDENTS AND CONSEQUENCES**

In cases when there are multiple prompts or consequences during an interval, record only the first prompt and/or the first consequence.

A single event may serve as both a prompt and a consequence. For example, "Finish eating your lunch and you can going out to play!", is both a prompt (to increase food) and a consequence (reinforcement for food).

When the target child is a participant in a group, code prompts and consequences provided to that group. For example if T.C. is a member of the Striders, "All the children in the Striders Group did such a good job sprinting to the finish." is coded as reinforcement/positive feedback (9.2) for high intensity activity (10.2).

## **7.0 PROMPTED EVENT**

Code prompted activity only as it relates to the ACTIVITY LEVEL (3.0) codes. ACTIVITY LEVEL codes 4 & 5 (walking and very active) are scored as high intensity activity (7.2); and codes 1, 2, & 3 are scored as low intensity (7.3).

Do not code whether the event prompted is a relative change (increase or decrease) in intensity from a previous level. For example, a teacher pushing a child on the swing is coded as "a teacher prompt to increase a low intensity activity (sitting)".

Code (7.4) food when the prompted food-related event refers either to general eating (e.g., references to "dinner", "meals", "Eat it all".) or for eating a specific food or food group (e.g., peas, vegetables).

When there are multiple and complex prompts, code for the first behavior prompted. For example, "Don't play so hard, come in and rest." is coded as a prompt to decrease (6.3) high intensity activity (7.2), not as a prompt to increase low intensity activity. Similarly, "Don't sit in front of the tv all day long, go outside and play." is coded as a prompt to decrease (6.3) a low level activity (7.3).

Code all prompts that relate specifically to doing gross body activities. For example, "Go mow the grass." is coded as a prompt to increase/do high intensity activity (7.2) and "Go watch tv for a while." is a prompt to increase/do low intensity activity (7.3). "Get busy and do your chores." is also coded, but this sentence demands that the observer interpret the intensity level of the chores to be done (7.2 or 7.3). Code "Go to the refrigerator and get the milk." as a prompt to increase high intensity activity (7.2). Do not code statements such as "Pass the butter." or "Get your feet off the table and sit up straight." as prompts related to specific activity levels.

## **8.0 CHILD RESPONSE TO PROMPT**

The child's response must refer to the antecedent (prompt or imitative model) that is indicated in 6.0.

Code the child response to the first prompt. In instances of complex prompts (e.g., multiple prompts for the same event, such as "Eat your soup....'child pause'....I told you before eat your soup".) wait until the end of the interval to make your decision. If another person interacts regarding the same behavior, code what the interaction was regarding the first prompt.

'1' (none during interval) is coded unless the child complies or refuses within the time remaining in the interval or the antecedent (6.5) was a child request.

'2' (complies) may include either a physical or verbal response, however the physical response takes priority. For example, if "Eat your soup, child.", is followed by a verbal, "Yes, mom.", but no ingesting of soup actually occurs during the interval, then the code is '1' (no response) is entered.

'3' (refuses) may include either overt physical or verbal responses to the prompt

A child response is not coded when the antecedent (6.5) is a child request.

## **9.0 CONSEQUENCES**

Code consequences (reinforcers or punishers) that either have an immediate effect (are contingent) on eating or physical activity or are stated that they will or may have at some time during the remaining part of the observation day.

Consequences specified for beyond the observation day are not coded. For example, code "Eat your veggies, and I will take you skating next Tuesday.", as a prompt to increase food, but not as a consequence.

Stated (i.e., verbal) consequences must be direct and refer to immediate specific and concrete events, and not refer to remote and vague concepts such as references to becoming fat, fit, or sick.

Consequences phrased positively are coded as reinforcement/positive feedback (9.2).

(E.g., "Clean your plate and you can have some ice cream").

Consequences phrased negatively, are coded as punishment/negative feedback (9.3).  
(E.g., "If you don't clean your plate, you can't have any ice cream.")

The consequences may be either verbal or physical.

Record verbal consequences that are made regarding and heard by the target child but spoken to others. For example, code when a target child hears his/her mother stating to father, "Look at that T.C., I'm so proud of the way he's exercising (or eating)".

### **7.0 and 10.0. PROMPTED AND CONSEQUATED EVENTS**

Generally, low intensity activities (7.3) are those within ACTIVITY LEVELS 1, 2, and 3 and high intensity activities (7.2) are those within levels 4 and 5. However, references to (prompts and consequences related to) all locomotor activities (e.g., walking, running, hopping, skipping, galloping, chasing, fleeing, dodging, and crawling), as well as manipulative (e.g., throwing, catching, kicking, punting, dribbling, volleying, and striking) and non-manipulative activities (balancing, rolling, twisting, hanging, jumping) that involve gross motor movement are coded as high intensity activities (7.2).

### **10.0. CONSEQUATED EVENT**

Code food (10.4) when the event consequated is related to either general eating behavior or for eating a specific food or food group.

Code child request (10.5) when the child's request for food or physical activity is consequated.

Child responses to consequences are not coded.