

Physical Activity and Healthy Eating Annotated Bibliography
National Institute on Out-of-School Time
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The following abbreviations are used in these notes (and in quotes):

PA=Physical Activity

HE= Healthy Eating

SES=Socioeconomic Status

A

Action for Healthy Kids. (2004). The Learning Connection: The Value of Improving Nutrition and PA in our schools.

- “PA in adolescents has consistently been related to higher levels of self esteem and lower levels of anxiety and stress – each of which has been associated with better academic performance.” (5)
- “Emerging research also suggests an association between weight problems and lower academic achievement. Perhaps the most obvious reason is increased absenteeism, which has been clearly and directly linked to poorer academic performance.” (5)
- “Schools have repeatedly been cutting back on PA and PE programs, primarily to allow for more classroom time to improve test scores and grades. Yet there is little or no data to support this practice. A growing body of evidence suggests less time dedicated to PE/A may undermine the goal of better performance, while adding time for PA may support improved academic performance.” (7)
- “Fewer than one in four American children get 30 minutes or more of PA per day – and more than three in four get no more than 20 minutes of vigorous PA per day.” (9)
- Milk consumption has decreased, soda consumption has increased. Children eat too much fat. Bad eating habits lead to lowered intake of nutrients needed for healthy development. (9)
- Whitefish Central School in Montana removed unhealthy options from lunch and reduced disciplinary referrals after lunch from 6-8 per week to one to two per week. (10)
- “There is a growing body of evidence that children who eat poorly or who engage in too little PA do not perform as well as they could academically, and that improvements in nutrition and PA can result in improvements in academic performance.” (13)
- PA also affects school performance. Schools with PE have students that focus better, show up more, and are less disruptive. (14-15)
- “One recent study, however, found that lower math scores among boys in kindergarten could not be explained by other factors such as race/ethnicity and the mother’s level of education. For these boys the negative effect of being overweight on math scores was found to be statistically equivalent to watching two extra hours of television each day.” (16)
- Schools are cutting back on PE, selling and advertising unhealthy food, and thus promoting obesity. They tend toward more classroom time and less PE time, presuming that this will improve scores. Findings seem to show the opposite is true. Additionally, school decline in PE coincides with age decline in PA. (21-25)

- Action for Healthy Kids is a public-private partnership working to improve students' eating habits and increase their PA while educating adults on the important role of good nutrition and PA in academic achievement. (27)
- Things schools can do to improve kids' eating and PA: 1) Form a health advisory council of adults in and out of the school community to help develop and promote policies that address the nutrition and PA needs of kids. 2) Develop a comprehensive wellness policy. 3) Integrate PA and nutrition education into the regular school day. 4) Incorporate nutrition education and PA into after-school programs. 5) Encourage staff to model healthy lifestyles. (28)
- "The Commitment to Change" instituted by Action for healthy Kids: 1) Provide age appropriate and culturally sensitive instruction in health education and PE. 2) Provide students in pre-K-12 with behavior focused nutrition education integrated into the curriculum. 3) Ensure that meals offered through all school feeding programs meet federal nutrition standards. 4) Ensure that all foods and beverages available on school campuses and at school events contribute toward good eating patterns. 5) Provide food options that are low in fat, calories, and added sugars. 6) Ensure healthy foods and snacks are provided in vending machines and other venues within the school's control. 7) Prohibit student access to venues that contain foods of minimal nutritional value in elementary school, and restrict such access in middle junior and high schools. 8) Provide adequate time for meals. 9) Provide all kids from pre-k -12 with quality PE daily. 10) Provide daily recess for elementary schools featuring unstructured, supervised play. 11) Provide adequate co-curricular PA programs including intramural programs, PA clubs, and after-school programs. 12) Encourage the use of school facilities for PA programs offered by the school or community based organizations outside school hours. (29-30)

Action For Healthy Kids (2007). Helping Youth Make Better Food Choices: Ideas From and For Nutrition, Health and Public Health Professionals Leading the Way. Action For Healthy Kids, <http://www.actionforhealthykids.org/resources/files/boardafhkfoodchoicechallenges.pdf>.

- This article outlines challenges which "nutrition, health and public health professionals who participated in a recent Action for Healthy Kids research project" noted as the top obstacles in fighting childhood obesity. The article also describes what can be done to lessen these challenges.
- "More than ¾ of respondents cited lack of parent/caregiver support as the major obstacle they face in helping kids make better food choices." (2)
- "Survey respondents tend to believe that no amount of work on the part of schools and the community to increase children's intake of nutritious foods can succeed if parents aren't part of the solution—it has to be a total team effort—in and out of school." (2)
- "Develop a friendly relationship with parents by regularly scheduling support sessions to guide them. Build on successes by setting short-term, attainable goals that the entire family can reach – one good habit at a time." (3)
- "Children eat what they know. That is, if kids' only food experience involves foods with little nutritional value, they won't be able to make better food choices. Respondents also indicated that it's easier to encourage healthful foods than it is to convince kids to give up certain 'junk' foods." (4)

- Changing the school food environment so that unhealthful options are not available. Providing access to healthful choices, and starting young and building positive attitudes are the keys to helping youth make better food choices.” (4)
- In order to get kids engaged and interested in HE, we need to “reframe nutrition as something important to youth,” and “help children take ownership of their eating habits so they feel that eating well is a choice, rather than something they have to do.” (6)
- There is also a section on advertising and it is suggested that “To counteract the persuasive influence of the media, nutrition, health, and public health professionals recommend education youth on how to separate ‘good’ from ‘bad’ media.” (8)
- “In order to make HE relevant and engaging for youth, it is important to focus on how to make better food choices in addition to why.” (10)

Afterschool Alliance (2006). Active Hours Afterschool: Childhood Obesity Prevention and Afterschool Programs. Afterschool Alliance, 24.

Includes statistics on childhood obesity, PA, HE, and the role of afterschool programs.

“The physical activity and health promotion activities that take place in the hours after school can be as varied as the programs that provide them.”

Afterschool Investments. (2006). Promoting PA and Healthy Nutrition in Afterschool Settings: Strategies for Program Leaders and Policy Makers.

- 15% of children 6-19 (in the US) are obese. (6)
- Lack of PA and poor dietary habits part of the cause. (7-8)
- Examples of campaigns (national, state, community-level) that work on increasing PA: Girls on Track, Promoting Healthy Activities Together (PHAT) Campaign, Verb™ It’s what you do.
- Examples of programs promoting good nutrition: Power of Choice, Edible Schoolyard.
- Examples of programs which integrate health and nutrition in to academic content: Planet Health, Project LIFE, The First Tee of Denver (golf-related).
- Examples of programs which engage parents: We Can! (Ways to Enhance Children’s Activity and Nutrition), Team Nutrition, Eat Smart. Play Hard™.
- Fit Source is an interactive web site which offers a variety of PA and nutrition resources. It is run by part of the U.S. Department of health and human services. Media-Smart Youth encourages kids 11-13 to be aware of the role media shapes in affecting their choices.
- There are about 4 main problems for afterschool providers who want to foster a healthy lifestyle: 1) coordinating groups, particularly at different levels of government, 2) getting funding—most funding targets very narrow and specific topics, as opposed to “obesity prevention” in general, 3) identifying and sharing good practices, and 4) developing broad public messages—the obesity problem stems from social trends, changing societal views should help fix the problem.
- There is a need for good policies in order to have good programs. Good policies need to: educate providers about health, PA, and nutrition, as well as holding them accountable; facilitate access to funding; share information, take concerns into account, provide incentive to try to create healthy lifestyles (making it part of accreditation standards, etc).
- Federal programs to help provide healthy food: National School Lunch Program (provides afterschool snack program), Child and Adult Care Food Program (provides

reimbursement for food to mostly everyone except for-profit providers), Summer Food Service Program (provides money to feed kids over the summer or breaks from school).

- The Children's Hunger Alliance of Ohio helps programs get funding and helps programs plan programs, etc.
- Food Research and Action Center.
- Girls Health Enrichment Multi-Site Studies (GEMS) and Trial of Activity for Adolescent Girls (TAAG) are programs that not only provide health and nutrition information but study the impact of the programs. GEMS focuses on African American adolescent girls; TAAG looks at the effect of community involvement on girls developing healthy lifestyles.
- Local Wellness Policies: required by federal nutrition programs afterschool programs can be included in the wellness policies; PA requirements: schools require PE, there is a worry that mandates will strain education, need to find ways to work both; Built Environment Designs: building environments that promote walking (sidewalks, playgrounds, etc).
- Financing strategies to consider: making better use of existing resources (coordinate and streamline different agencies to cut down on administrative costs), maximizing government revenue, creating more flexibility in existing categorical funding (similar to strategy one, too many programs with narrow target programs create inefficiencies in funding; creating more flexible categories will help create more money), building public-private partnerships (partnerships between different programs creates shared money), creating new dedicated revenue streams (fundraising helps with this). Examples of groups doing these things: YMCA of Santa Clara County, CA; Children's Hunger Alliance in Ohio, Project LIFE (learning involves PA for everyone).

B

Ball, S., Benjamin, S., Ward, D. (2007). Development and Reliability of an Observation Method to Assess Food Intake of Young Children in Child Care. American Dietetic Association, 107, 656-661.

"The purpose of this article is to describe the development and preliminary testing of an observation system used to assess the amount and type of food served and consumed by children in a child-care setting. We report interobserver reliability and validity data on specific components of this observation system." (657)

"Due to the limitations of most dietary assessment methods, especially in young children, exactly what and how much food children are consuming in the child-care facility is unclear." (656)

- "The most accurate method of determining dietary intake may be direct observation." (656)

"Structured observation in child-care facilities is a unique method to assess dietary intake of preschool children because it bypasses the parent or caregiver and allows for prospective data collection of dietary intake." (659)

"Child-care facilities, especially Head Start centers, may have access to or seek guidance from a nutrition professional. For nutrition professionals to improve the diets of children in these facilities it is imperative to know exactly what they are eating, but many nutritionists and registered dietitians focus their efforts on menu preparation and food

safety rather than intake. To ascertain dietary intake in this population, a feasible and accurate assessment method must be used because menus may not accurately reflect what children are consuming in the child-care environment. The information obtained from a dietary observation such as this can provide valuable insight into target areas for improvement.” (660)

Baranowski, T., Cullen, K. W., Nicklas, T., Thompson, Deborah and Baranowski, J. (2003). Are Current Health Behavioral Change Models Helpful in Guiding Prevention of Weight Gain Efforts? *Obesity Research*, 11, 23s-43s.

- “This paper reviews some of the more common behavioral conceptual models that can be used in obesity prevention program development and assesses how strongly the model is related to diet or physical activity behavior...This review of models is historically organized. This broad overview cannot be considered a thorough analysis of all the strengths and weaknesses of each model but is an introduction to and a preliminary assessment of the potential of each model for use in obesity prevention.” (25s)
- “The Knowledge-Attitude-Behavior model proposes that behavior changes gradually. As knowledge accumulates in a health behavior domain, changes in attitude are initiated. Over some period of time, changes in attitude accumulate, resulting in behavioral change...The primary resource in this model seems to be the accumulation of knowledge...The most common procedure for promoting change by use of this model has been the provision of information, most often in the form of school curricula... For example, parents who had less accurate knowledge of dietary principles were more likely to have overweight children (25). An unstated implication was that this knowledge deficit was a cause of the obesity and could be remediated, thereby minimizing the percentage of overweight children. No research, however, has demonstrated that knowledge-based intervention programs lead to behavioral change.” (25s-26s)
- “A problem has been that the concept of knowledge is not well specified. For example, in regard to diet, knowledge could include awareness that the consumption of certain foods or nutrients is related to specific health outcomes, the means of identifying the food sources of nutrients or the geographic or historic sources of foods, how to prepare certain foods, how to prepare certain foods in the context of select cuisines, or how to prepare certain foods in ways that people tend to enjoy eating them, and so forth...Thus, knowledge may be integrated into larger conceptual frameworks to help provide some understanding of the process or mechanism of change, but increasing knowledge by itself does not seem to be useful in promoting behavioral change...This anecdotal information suggests that knowledge by itself can lead to behavioral change among the "right" people. However, this is clearly operative in only very limited subsets of people...Thus, the KAB model, by itself, seems to be inadequate as a means of understanding or promoting dietary or physical activity-related behavioral change. The concepts of knowledge and attitude need to be more clearly specified conceptually and related to other variables within an overall process of change.” (26s)
- “A modern version of BLT [Behavioral Learning Theory] that has been applied to obesity is the Behavioral Economics model (36). As suggested by economics, behavior is the result of benefits and costs. Benefits are interpreted as reinforcers. The reinforcing value of behaviors or the outcomes of those behaviors differ among people. Obese people obtain more reinforcing value from food than non-obese people (37). The ability to wait

longer to earn a larger reinforcer instead of taking a smaller reinforcer immediately is called self-control...physical activity was found to be more reinforcing among non-obese people, least reinforcing among very obese people, and reinforcing at a middle level for moderately obese individuals...Research on ways in which the Behavioral Economics model could be used to prevent obesity would include finding ways to supplement the reinforcing value of low-energy foods and high-energy physical activity among those who find high-energy foods and sedentary behaviors highly reinforcing. This could be done by providing other reinforcers (e.g., money), finding balances between more and less reinforcing behaviors, or reducing the reinforcing value of undesired behaviors, for example, by increasing the distance...Some, but probably not all, parents may be able to do this. These procedures could be applied to every decision in the eating or physical activity event. Public health physical environmental changes to promote activity (e.g., designing a neighborhood with sidewalks and parks) could also influence the reinforcement value of a behavior.” (27s)

- The Health Belief Model (HBM)...include perceived susceptibility (a person's perceived risk for contracting an illness or health condition of concern to the researchers), perceived severity [a person's perception of the personal impact (clinical or social) of contracting the illness], perceived benefits (a person's perception of the good things that could happen from undertaking specific behaviors, especially in regard to reducing the threat of the disease), perceived barriers (a person's perception of both the difficulties in performing the specific behaviors of interest and the negative things that could happen from performing those behaviors), cues to action [the environmental events (e.g., learning that a parent had a heart attack), bodily events (e.g., aches or pains), or stories in the media that trigger perceptions of susceptibility], and in later versions of HBM, self-efficacy (a person's belief or confidence that he or she can perform a specific behavior).” (27s)
- “The primary motivation to change within HBM is the level of perceived threat or the risk of a specific condition...The primary resource for change within HBM is self-efficacy. People with greater levels of self-efficacy, or confidence, will more likely engage in a specific behavior, persist until they get it right, and maintain the behavior...A person obtains certain cues, such as a television program on heart disease, that stimulate or exacerbate the person's perceived threat of the disease by either influencing perceived seriousness or susceptibility, or both...to some threshold at which the person decides to take action. Which action a person selects is the result of the perceived benefits, the perceived barriers that could be overcome, the costs that would be avoided, and the confidence (self-efficacy) that the person has in his or her ability to perform the alternative behavior...The research, however, usually focuses on doing, or not doing, a single specific behavior...Little research has addressed cues to action, a possible procedure for promoting change, in part because they may be so unpredictable or ephemeral...Internal cues, such as, feeling better physically or mentally after beginning to take action, were rated as the most likely to prompt action.” (27s-28s)
- “Fear-based communications did effectively influence individuals' perception of a threat, and the individuals selected a behavior to reduce the threat according to both the efficacy of the response (whether the behavior reduces the threat) and self-efficacy (whether the person is confident that he or she can perform the behavior)...The Theory of Protection Motivation (TPM), susceptibility by seriousness interaction term in regard to a person's

motivation to act was detected in a within-subjects analysis, but not a between-subjects analysis (54), and the patterns of the interaction varied substantially among people. When exercise was perceived as an effective means of reducing the threat of colon cancer, people were more motivated to exercise (55). However, the threat component did not predict intentions or behavior, leaving the authors to conclude that there are limitations to fear campaigns and effectiveness was most likely to be derived from self-efficacy and response efficacy communications (56)...many of the predictions from HBM have not been confirmed.” (28s)

- “To be useful, research with HBM and related models (Perceived Risk Model, Risk Communication Model, Fear Appeals Model, and TPM) needs to establish a perceived seriousness of and susceptibility to obesity (in regard to a broad range of medical, personal, and social outcomes), the cues to action, what behaviors are perceived to minimize risks from obesity, the benefits of the various behaviors, the barriers to performing the various behaviors, and the self-efficacies from performing the various behaviors...The same relationships must be assessed among both obese and non-obese individuals in a variety of populations (people of different sexes, ethnic groups, and age groups). Procedures that affect these mediating variables and that result in the desired corresponding behavioral changes must be identified. Because children and adolescents tend to perceive themselves as immortal, the concepts may not be very useful among these age groups.” (28s-29s)
- “Social Cognitive Theory (SCT)...concept of reciprocal determinism proposes that behavior is a function of aspects of the environment and of the person, all of which are in constant reciprocal interaction...The primary personal concepts of SCT for understanding behavior include skills (the ability to perform the behavior when desired), self-efficacy (the confidence that one can perform a specific behavior under a variety of circumstances), and outcome expectancies (the outcomes likely to occur from performing the behavior). Key environmental variables include modeling (learning how to do a behavior by watching someone do it and receiving reinforcement for it) and availability (whether food or physical activity equipment is present in an environment for consumption or use) (58). The primary concepts of SCT for changing behavior revolve around the ability to control one's own behavior: self-control...The primary motivational variable in SCT is outcome expectancies: people desire to achieve positive outcomes and avoid negative outcomes. The primary resources in SCT are skills and self-efficacy to perform the behaviors...One can learn self-control skills, a behavioral change procedure, in which increasingly more difficult behavioral change goals are set, progress toward goal attainment is monitored, and success in goal attainment is rewarded by either external incentives or an internal sense of accomplishment. If a goal is not attained, problem-solving and decision-making procedures can be used to increase the likelihood that the old goal will be attained or a new, more achievable goal will be set (57,62)...In a complex model accounting for many competing influences, self-efficacy was the most significant predictor of physical activity for 2 consecutive years...People increased their self-efficacy more from performing an act than from seeing a model do it or from someone persuading them...In a comprehensive review of the dietary intervention literature, goal setting was identified as one of the few intervention procedures consistently associated with changes resulting in the consumption of more fruits, juices, and vegetables and lower levels of fat among adults...Recent findings from studies with

children revealed that enhancement of dietary change by goal setting was a complex function of whether children preferred the food and how much they ate at the baseline... To date, the poor predictiveness of these concepts for understanding diet and physical activity among children (82) is of substantial concern. It is not clear whether the concepts have not been appropriately applied; they are too cognitive or cerebral to capture the behaviors of children, or the measures are too unreliable. Further research with SCT and children should emphasize decisions in the eating and physical activity events over which children exert the most control, and thereby, the cognitive variables could be expected to be predictive. Younger children may not exercise much control over their diet or physical activity. Perhaps environmental variables [e.g., parenting (83) or availability (58)] offer the most promise with younger children.” (29-30s)

- “The Theory of Reasoned Action (TRA) or the Theory of Planned Behavior (TPB)...proposed that people are more likely to perform a behavior when they intend to perform that behavior. The level of intention to perform a behavior is higher among those who have a more positive attitude and more of a subjective norm toward the behavior. The attitude toward the act, in turn, is an interactive function of the strength of the person's beliefs about what will happen as a result of doing the behavior (similar to SCT's outcome expectancies and HBM's pros) and the strength of the extent to which the person positively or negatively values those outcomes. A person's subjective norm, in turn, is an interactive function of the strength of the person's beliefs about whether specific people want them to do the behavior (or not) and the strength of the person's desire to please or otherwise comply with those people. Attitudes and subjective norms linearly combine to cause intention, and intention predisposes an individual to perform a behavior within the context of other influences...TPB expanded TRA by proposing that intention is also influenced by perceived behavioral control (86). Perceived behavioral control, in turn, is an interactive function of control beliefs (i.e., whether there are factors that facilitate or inhibit performance of the behavior) and perceived power (i.e., the strengths of each factor to facilitate or inhibit the behavior)...For dietary behaviors, attitude predicted most of the variability, with progressively lower proportions predicted by perceived behavioral control and subjective norms (89). The level of predictiveness dropped dramatically when somewhat more objective measures of the behavior were used (90, 91). The subjective estimates, which were more highly predicted, revealed more error, suggesting the models were predicting error variability (91). Among adolescents, TPB accounted for only 7% of the variance in fruit and vegetable intake (92) but 35% of the variance in soft drink intake (93)...Among adolescents, TPB accounted for only 6% of the variance in moderate to vigorous physical activity when it was objectively measured... To deal with the problem of obesity, one author who has published in the TRA and TPB tradition formulated a theory of goal striving (98), wherein "desire" was inserted before intention and "trying" was inserted before behavior, and incorporated goal attainment after behavior (99). The reasons for losing or maintaining weight were analyzed and shown to differ substantially between men and women (99). These models show promise in predicting obesity related behaviors...The lack of attention to procedures for changing components of TPB somewhat limits enthusiasm for using TPB as the foundation for intervention programs...” (30s-31s)
- “The Transtheoretical Model (T)...the focus of T is on promoting change in behavior, but several of the constructs employed (e.g., pros, cons, self-efficacy) imply a model for

understanding behavior...major contribution of T has been heavy emphasis on the extent to which behavioral change occurs in stages and the explanatory concepts used to show differences in influence across stages (102). How many stages adequately capture change is subject to dispute (103,104); however, the most common set of stages include pre-contemplation (not thinking about change or suppressing thoughts of change), contemplation (considering change but taking no action), planning or preparation (anticipating making efforts to change and considering what behavior one will do), action (actually engaging in efforts to change), and maintenance (expending effort to retain the changes made during action)...The pros and cons of behavioral change are the motivational mechanism in T: people change their behavior to attain desired ends and to avoid undesired ends. The resources within T include self-efficacy and the processes of change...Self-efficacy is likely the key factor in the action stage. Factors that maintain behavior have not been clearly specified...There has been much attention to "tailoring" within T. In tailoring, the investigator identifies each person's initial level of pro, con, or self-efficacy, prioritizes which should or can be targeted, and provides messages that attempt to change the belief (usually attempting to increase the perceived pros of the behavior or self-efficacy to perform the behavior). The procedures for stating or framing these messages to maximize the desired effect(s) have not been elucidated and seem to be conducted on an intuitive basis...Methodological concerns have been raised in regard to SOC. The duration during which people were in the action stage varied substantially (in contrast to the maximum of 6 months usually specified in T), and people were not always aware of the foods and practices that contributed to their behavior, making it difficult to stage them...T has been applied to obesity. In one study, the SOC for weight control at the baseline were not related to weight loss over a 3-year period (116). Linear stage-related differences in levels of physical activity and self-efficacy were detected among adults in the overweight or obese categories (106). Among Mexican-American women, obesity treatment practices among clusters of individuals were interpreted to be consistent with SOC by use of a multi-item approach to staging...Some conceptual clarity or consistency is needed in assigning people to stages. Currently, staging by algorithm produces different population clusters (with even different category names) from staging done by cluster analysis (117, 118). More research is needed to apply T to each of the decisions in an eating or physical activity event (Figures 2 and 3) by comparing those who are at risk of being obese and those who are not, identifying differences in each by SOC, testing tailoring procedures among those at risk of obesity, and developing measures of processes of change appropriate to those at risk of obesity." (31s-32s)

- "We all live in environments, called ecologies (119). Aspects of these environments are physical, which are often called ecological factors; other aspects of these environments include people, which are often called social ecologies. It has been documented for some time that environments directly affect health (120). Delineation of how the environment affects health has been more challenging because of the multilevel (e.g., regions, nations, states, cities, and neighborhoods), multistructural (e.g., physical environment, socioeconomic status, and social capital), multifactorial (e.g., diet, physical activity, smoking, and stress), and multi-institutional (e.g., local government, family, and local agency) nature of the influences and the interrelationships among these influences...Availability has been found to be related to dietary intake (126, 127) and to

obesity (126) in experimental studies as well. Similar paths exist for physical activity (122, 127)...The ecological and social ecological models have generally not included cognitive variables and thereby have no motivational variables. The resources necessary for behavioral change and the processes of behavioral change have not been clearly delineated. Possible processes include cues to prompt a behavior (129), facilitating or enhancing a behavior by having select foods or facilities available and accessible (58), and inhibiting or prohibiting a behavior by retarding or negating the availability or accessibility of foods or facilities...Procedures for change within an ecological framework have been discussed extensively (130) and could include legislation, policy changes (e.g., making only healthy choices available in vending machines) (131), ecologically sound design of neighborhoods, changes to the physical environment [e.g., adding physical activity-promoting playground equipment (132)], or placing signs to encourage the use of stairs...Although children in neighborhoods of lower socioeconomic status perceived more hazards, they were also more likely to be physically active (138). Boys were more likely to be physically active when they were outside and had supervision, whereas girls were more likely to be active indoors without supervision (139). A predominantly environmental intervention that manipulated physical education at school increased physical activity among male but not female students...With regard to eating behavior, children who ate the lunch provided through the National School Lunch Program (NSLP) ate a more nutritious lunch (140). Greater participation in NSLP was associated with smaller school size and a closed campus policy at lunch (141). The amount of time waiting in the lunch line was a disincentive to participation in NSLP (142). The availability of vending machines and snack bars in school lowered the levels of participation in NSLP (143). Decreasing the price of low-fat snacks in vending machines by 50% was associated with a 93% increase in their consumption (144). Moving from an elementary school where only the NSLP lunch was available to a middle school with a snack bar resulted in a 25% decrease in fruit and vegetable consumption...The ecological and social ecological models have much to offer obesity prevention (144, 147). More research is needed on how environments enhance or constrain diet and physical activity. More conceptually refined models of how environments might affect behavior are necessary, such as whether they affect behavior directly or through as yet unspecified mediating variables. More research that manipulates the characteristics of the environment and assesses its impact on behavior is needed.” (32s-33s)

- “Social marketing is not a model for understanding behavior but a set of procedures for promoting change in health-related behaviors. Based on the marketing principles used to sell products to consumers, social marketing has five key characteristics: 1) it attempts to change and maintain the voluntary behavior of target market members; 2) it does this by offering the target market members both a package of benefits from and a minimization of barriers to performing these behaviors; 3) the primary beneficiaries are the target market members rather than the marketers; 4) it promotes change by advocating for the target market member's self-interest (or the marketers' perception of that interest); and 5) those who use the marketing are fulfilling their own interest as well (e.g., reducing future medical costs by preventing obesity)...The primary motivation in social marketing is perceived self-interest. The primary resource of the participant is not well specified, although some attention to self-efficacy is provided. The processes and procedures of

change are that a social marketing company conducts an analysis. The target market is segmented into a small number of maximally homogeneous subgroups (market segments), and analyses are conducted to identify each of those submarket's perceived benefits and barriers...Because of the nature of social marketing, there have been few experimental trials (with treatment and control groups with random assignment between groups) of social marketing campaigns. Furthermore, because social marketing has not ordinarily been done by academic investigators, there are few well-published social marketing campaigns for obesity, diet, or physical activity. Thus, it is hard to disentangle whether changes in these areas have been caused by a specific campaign or other secular changes occurring in the society. Despite this limitation, many of the ideas (e.g., market segmentation) and procedures (e.g., market assessment using focus group discussions) of social marketing have been incorporated into programs conducted by academic investigators to promote behavioral change, and they continue to offer much promise.” (33s-34s)

- “The ability of psychosocial models to predict dietary behaviors (82) or physical activity behaviors (20) has been limited. Part of the problem has been the inherent complexity of the influences on these behaviors (149,150), the inherent unreliability of assessments of the target behaviors and of the theoretical constructs (151), and the lack of assessment of the influences of all factors related to making decisions to perform certain behaviors...Biological variables have been demonstrated to influence a variety of health-related behaviors (152). A substantial literature on biological influences on dietary intake exists, although one on biological influences on physical activity does not. A three-tier system of physiological, metabolic, and neurotransmitter influences on dietary intake revealed the enormous complexity of these influences...Energy intake seems to be regulated to ensure that it is sufficient to meet energy deficits from energy expenditure, and leptin seems to play a role in this phenomenon (156). Leptin is a hormone produced by white fat tissue in direct proportion to the white fat mass (157). Leptin receptors in the hypothalamus inhibit food intake and increase energy expenditure (thermogenesis) (157). The pattern of experimental findings suggests that leptin affects intake more by inhibiting an excitatory pathway than by directly increasing satiety...research should address the extent to which self-control procedures can enable a person to overcome this reluctance to eat the bitter foods. For example, can goal setting be used to enable people who are sensitive to the bitter taste and who do not like the vegetables consume more vegetables, or does goal setting work only among those who cannot taste the bitterness?...Increased water intake may enhance satiety (163) and displace caloric intake from soft drinks and sweetened fruit-flavored drinks...The consumption of some fats (e.g., medium-chain fatty acids) may enhance satiety and energy expenditure and result in decreased fat stores and a lower body weight (166). Although the consumption of sweetened beverages has been associated with obesity in children (7), consumption of a highly concentrated sucrose solution resulted in less weight gain than consumption of an isocaloric fat or control diet (167). Physical activity may be particularly important for weight management because it burns calories in general and because it preferentially burns fat (168). Obesity prevention would be enhanced by more research elucidating the relationships among psychosocial, biological, and behavioral variables.” (34s-35s)
- “Obesity is more common among ethnic minorities, and the predisposition to obesity is detectable among children. Despite these factors, only small percentages of the theory-

based research described here have been conducted with obese individuals or those at risk of obesity, ethnic minority groups, individuals of lower socioeconomic status, or children...At what ages these models apply and how these models can reliably be used to obtain measurements for children have not been specified....The competing influences of parents, peers, and personal control across ages have not been elucidated; and so the age at which these models, which are strongly based on the individual, apply is not clear...little has been explicated on whom the interventions have reached (179) or how representative the participants were.” (35s-36s)

- “Much of the published literature predicting dietary or physical activity variables from one or more theories has involved taking a set of variables (usually associated with one theory, but sometimes with no theory at all) and conducting a regression analysis to assess the extent to which the variables predicted the behavior of interest. Whereas this was satisfactory in the early stages of understanding the behaviors, the major contributions henceforth will be made from critical tests of the assumptions of the theories, comparing the extent to which two theories predict the same behavior, and introducing new variables to extend the existing models to encompass new concerns. The limited predictiveness of most of the existing models suggests there is substantial room for growth of our knowledge.” (37s)
- “Emotions (depression, anxiety, and arousal) are important aspects of behavior. Depression and anxiety may be particularly important aspects of obesity (180). Only investigators in the tradition of TPB have made substantial attempts to incorporate emotion-related variables.” (37s)
- “Unfortunately, when possible mediators of intervention programs have been tested, most mediators specified by the investigators did not change, and those that did changed only a small amount (10, 11). This suggests that intuitively reasonable procedures have little efficacy. Even goal-setting procedures among children did not seem to work in obvious ways.” (37s)
- “An early comprehensive review of nutrition education interventions suggested that interventions designed in light of behavioral theory were more likely to result in change than those not predicated on theory (26). A more recent review that applied screening criteria to the quality of the research to be included suggested that studies that were designed in light of theory were no more likely to result in behavioral change than those that were not so designed.” (37s-38s)
- “It is difficult to get external funding for large field trials of interventions. Thus, when such funding is obtained, funding should be included for process evaluation (179) and analyses of mediating and moderating variables...Analyses of moderating variables provide information on whether programs worked with some kinds of people but not others. For example, if it is consistently found that a program is not working with certain groups; alternative programs need to be developed for those other groups. Analyses of moderating variables should also be required of field trials of interventions that receive funding.” (38s)
- “Although obesity is due in part to certain genetic predispositions and metabolic abnormalities, the huge increases in obesity in the past 20 years have been caused by behavioral and social ecological factors. Behavior- and ecology-based problems require behavior- and ecology-based solutions. Much interesting and important work has been done, but little has been conducted in regard to obesity prevention. The pursuit of

explanatory and intervention research within the context of TPB (because of the theoretical advances), goal striving (because of the application to obesity), and social ecology (because of the apparent influences of ecological variables on diet, physical activity, and obesity) seem to offer the greatest promise for obesity prevention. Research on the relation of behavioral and biological influences on behavior and obesity also seems to be promising.” (38s)

Barnett, T. A., O’Loughlin, J., and Paradis, G. (2002). One- and Two-Year Predictors of Decline in PA Among Inner-city Schoolchildren. *American Journal of Preventative Medicine*, 23, 121-128.

- “Data for this study were collected in classroom questionnaires each May/June from 1993 to 1997.” (121)
- “History of physical inactivity is the best predictor of future inactivity.” (121)
- “High levels of TV viewing among girls and low participation in school sports teams in boys and girls” are risk factors for decline in PA. (125)
- “Being of Asian origin was predictive of decline in boys even after adjusting for being ‘born outside Canada,’ suggesting that while the effect of birth country on decline may be mediated by the family SES, cultural and ethnic factors are likely involved. It is possible that some cultural groups respond unfavorably when sports teams become more competitive in higher grades, or are more willing to forfeit time devoted to free-play activities as school demands on their time increase.” (125-126)
- “Intervention programs need to be tailored to specific cultural and ethnic preferences of groups, such as... those of Asian origin.” (126)
- “Experience with school sports teams can influence the degree to which children will adhere to active lifestyles.” School sports teams are positively correlated with more PA. (126)

Boyle, D. E., Marshall, N. L., and Robeson, W. W. (2003). Gender at play: Fourth-grade Girls and Boys on the Playground. *American Behavioral Scientist*, 46, 1326-1345.

- This observational study watched children at 67 recesses in New England. (1326)
- Sports teams at recess are often dominated by boys. “About 15 kids playing kickball....four girls playing...The late arrival was a girl.” (1329) “A group of about 10 of them, all boys, start playing football on the drive.” (1393) “The boys charge out...and run immediately to the basketball court and began to play.” (1330)
- Girls walk and talk in small groups (1330), girls practice dance and cheerleading (1331), girls climb on the jungle gym and jump rope (1331), occasionally they play all girls sports like soccer or red rover, girls did not play football. (1332)
- Boys have high level of PA, create and participate in sports games. (1334)
- Boys often exclude girls from their games, i.e. in one soccer game the boys never let the girls have the ball (1339)

C

Caine-Bish, N., Scheule, B. (2009). Gender Differences in Food Preferences of School-Aged Children and Adolescents, 79, 532.

- “Food preferences differed between genders and these gender differences varied among elementary, middle, and high school students. Gender differences should be considered when providing food choices to boys and girls at all ages.” (532)

Centers for Disease Control. (2003). PA Levels Among Children Aged 9-13 years – United States, 2002. *MMWR Weekly*, 52, 785-788.

- CDC developed the Youth Media Campaign to encourage children aged 9-13 to be physically active. (1)
- “61.5% of children aged 9-13 years do not participate in any organized PA during their nonschool hours and that 22.6% do not engage in any free-time PA.” (1)
- Studied with a random digit dialed telephone survey of children 9-13 and their parents. 3,120 parent/child dyads responded. Data on race/ethnicity was only analyzed for non-Hispanic Black, non-Hispanic White, and Hispanic children.
- “Fewer children aged 9-13 years reported involvement in organized sports (38.5%) than in free-time PA (77.4%).” (1)
- Lower SES and minority status was associated with a significantly decreased likelihood of reporting involvement in organized activities. Concerns about transportation, opportunities, and expense were reported more often by minority groups. Concerns about neighborhood safety were greater for girls than boys and Hispanic parents than non-Hispanic parents. (1-2)
- Interest in a particular kind of sport was divided along racial/ethnic lines. “Among children aged 12-13 years, basketball was mentioned most often by non-Hispanic black girls and boys, soccer was mentioned most often by Hispanic girls and boys, and baseball/softball was mentioned most often by non-Hispanic white girls and boys.” (2)
- “Overall, regardless of age or sex, children reported that their most frequent free time activities were riding bicycles and playing basketball. Basketball was the only activity that was reported frequently for both organized and free time. Bicycle riding was reported more frequently by children aged 9-11 years, and basketball was the most common free-time activity among children aged 12-13 years.” (2)
- “The findings indicate that although the majority of children aged 9-13 years engage in some level of free-time PA, increased rates of participation in both free-time and organized PA are needed, especially for non-Hispanic black and Hispanic children.” (2)
- Limitations: telephone survey, may not be representative of the whole country; self-reported data can be inaccurate; activities reported might be seasonal (summer) and not year-round; duration of PA could not be measured because young children “are unable to aggregate minutes of PA accurately over several days.” (2)
- CDC also has media campaign (VERB™ It’s what you do) designed to make PA look cool fun and socially appealing.

Coleman, K., Geller, K., Rosenkranz, R., Dzewaltowski, D. (2008) Physical Activity and Healthy Eating in the After-School Environment. *Journal of School Health*, 78, 633-640.

- “The current study described the quality of the after school environment for its impact on children’s MVPA (moderate and vigorous physical activity) and HE (healthy eating).” (633)
- “The quality of after school programs can be improved by providing fruits and vegetables as snacks; offering more free play activities; training the after school staff in

simple, structured games for use in a variety of indoor and outdoor settings; and training after school staff to promote and model MVPA and HE in and out of the after school setting.” (633)

- “There is now an emerging body of evidence that at least 4 behaviors play a role in positive energy balance and the development of childhood obesity: lack of PA, lack of fruit and vegetable consumption, and use of TV and video games (screen time).” (634)
- “Due to the gap in time that exists between parents’ working hours and their children’s school hours, programs offered after school have been identified as one of the potentially important environments for child and adolescent health promotion efforts and may be a particularly effective place for obesity prevention.” (634)
- “There were no instances observed where a leader encouraged their children to be physically active outside of the after school setting.” (637)
- “Whole fruits and vegetables were offered infrequently.” (638)
- “We found that children in an after school setting were spending significantly more time in MVPA while in free play than when in organized activities.” (638)
- “We found that as long as the children were moving, discouraging comments were kept to a minimum. However, leaders did discourage PA during organized sessions more so than during free play. This may reflect the lack of training that many after school leaders have in conducting structured activities such as games.” (638)
- “Although there was a snack at every observed after school session, they were often high in carbohydrates such as sugar and high-fructose-corn-syrup. The least common snack was a fruit or vegetable, and most common was some kind of bread or candy.” (638)
- “At no time did we observe afterschool leaders encouraging HE within or outside of the school setting.” (638)
- Some suggestions from this study are: “providing access to water, fruits, and vegetables as snacks; training the after school staff in simple HE and PA messages as well as how to be more encouraging toward healthy choices within the after school setting and at home; encouraging free play activities; and training the after school in simple, structured games for use in a variety of indoor and outdoor settings. These clear, simple modifications could make a substantial impact on the after school setting for promoting healthy lifetime behaviors in young children.” (639)

Committee on Environmental Health. (2009). The Built Environment: Designing Communities to promote Physical Activity in Children. *PEDIATRICS: the official journal of the American Academy of Pediatrics*. 1591-1598.

- This article discusses how neighborhoods and communities should be designed in order to promote PA in youth. Some things that are focused on in this article are the need for children to live closer to school so that they can walk to and from school, the need for reduced perception of crime so that parents feel safe letting their children play outside, and the need for traffic danger to decrease.
- “This policy statement highlights how the built environment of a community affects children’s opportunities for PA.” (1591)
- “Children can engage in PA as a part of their daily lives, such as their travel to school.” (1591)

- “Actions that reduce parental perception and fear of crime may promote outdoor PA. Policies that promote more active lifestyles among children and adolescents will enable them to achieve the recommended 60 minute of daily PA.” (1591)
- “the overall structure of the physical environment of a child’s community (referred to as the ‘built environment’) can also affect health in diverse ways.” (1591)
- “Some urban areas may have few supermarkets, produce stands or community gardens, thereby limiting access to fresh fruits and vegetables. The physical environment of a community can support opportunities for play, an essential component of child development, and for PA, a health behavior that not only reduces risk of excess weight gain but also has many other benefits for overall well being.” (1591)
- “Environments that promote more active lifestyles among children and adolescents will be important to enable them to achieve recommended levels of PA.” (1591)
- “An important component of a healthy lifestyle is participation in activities which exercise is not the primary goal. This might be a ‘purposeful walk’ – and errand to buy groceries or a trip to school.” (1592)
- “The positioning of homes, schools, businesses, parks, and sidewalks within a neighborhood can influence PA.” (1592)
- “When parents are asked what prevents their children from walking to school, the second most commonly mentioned factor is traffic danger.” (1594)
- This report also includes a section titled “Recommendations for Pediatricians” and another titled “Recommendations for Government” on page 1595.

Cooke, L. (2007). The importance of exposure for healthy eating in childhood: a review. British Dietetic Association Ltd, 20, 294-301.

- This article is a review of several studies which aspired to determine different methods to encourage children to eat a varied and healthy diet, with vegetables being the main target. (294, 298)
- “In an investigation into the relationship between children’s food preferences and consumption patterns Birch (1979), found that between 50% and 60% of the variance in 3- to 4-year olds preference for a particular food was explained by its sweetness, together with its degree of familiarity, the former being genetically determined and the latter being the product of experience. Further evidence of the strong relationship between familiarity and preferences comes from Cooke & Wardle’s (2005) survey where foods that had been tried less often tended to be less liked and vice versa.” (295)
- “Put simply, it appears that children like what they know, and eat what they like.” (295)
- Neophobia is noted as a reason for why children tend not to have the varied diets that are most beneficial to them. Neophobia is when “new foods are approached with...fear” and neophilia is when “new foods are approached with...interest.” (295)
- “Eight exposures to a sweetened orangeade were sufficient to increase 8- to 11-year olds’ preferences in one study (Liem & de Graaf, 2004), but in another study of 7–9 and 10- to 12-year olds, up to twenty exposures were given and increases in willingness to try other novel foods was only achieved among the older age group (Loewen & Pliner, 1999). The sheer number of exposures required may be counterintuitive to mothers who typically offer a new food only a limited number of times before concluding that their child does not like it (Carruth & Skinner, 2000; Skinner et al., 2002a; Carruth et al., 2004).” (296)

- “It appears that success will be more easily achieved if the target food is one that is relatively acceptable to the general population, if the number of exposures is appropriate to the age group of participants, and if actual tasting is involved.” (298)
- “Studies asked the parents to offer their children vegetables multiple times throughout the study. For example, one study (Cooke & Wardle, unpublished data) had each mother offer her child “a small piece of the target everyday for two weeks.” (299)

Corbin, C. B. and Pangrazi, R. P. (2003). Guidelines for Appropriate PA for Elementary School Children: 2003 update.

- Guidelines are for children 6-12 years old.
 - Guideline 1: Children should accumulate at least 60 minutes and up to several hours of age appropriate PA per day. This should include both moderate and vigorous PA, and does not need to include continuous vigorous PA. (8)
 - Guideline 2: “Children should participate in several bouts of PA lasting 15 minutes or more each day”...“Examples of PA bouts are recess, PE, play-periods, and sport’s [sic] practices.” (9)
 - Guideline 3: “Children should participate each day in a variety of age-appropriate PA designed to achieve optimal health, wellness, fitness, and performance benefits.” Age appropriate PAs are listed in a pyramid (figure 1). (9)
 - Guideline 4: Periods of two hours or more of inactivity are discouraged for children, especially during the daytime hours. Children who are sedentary grow up into sedentary adults. The writers understand that children will need to sit still to learn in school and other structured activities, but free time should not include two hours of sedentary activity. (9)
- Rationale for guidelines
 - PA and chronic disease prevention and risk reduction: prevents health risks for premature death, heart disease, colon cancer, hypertension, diabetes, and osteoporosis. Also improves mental health and physical fitness. (10)
 - PA and obesity prevention: rising rate of obesity in children is due to increased caloric intake and decreased caloric expenditure. (10)
 - PA and physical growth and development: osteoporosis is associated with early physical inactivity; regular weight bearing and bone stressing PA is required to develop peak bone mass; higher peak bone mass decreases the likelihood of osteoporosis later. (10-11)
 - PA and physical fitness: PA and physical fitness aren’t strongly correlated in preadolescence, but it is later, so promoting PA habits will lead to physical fitness later. PA is associated with risk factor reduction for heart disease and diabetes in children, and with general health. (11)
 - PA and motor skills: varied kinds of PA help develop good motor skills, which can enhance the child’s ability to participate in activities later in life
 - PA and cognitive function: “Children learn through movement” time spent on PA does not detract from academic achievement, even though academic time is reduced. (11)
 - PA and wellness: regular PA increases self-esteem, self-efficacy, and positive mood states. (11-12)

- Unique characteristics of children: “Children are not little adults,” “children are active in ways that are different from adults.” (12)
- Decreasing PA across the lifespan: Children are more active than adults. If children aren’t active, then they will likely be sedentary adults. (12)
- Need for bouts of PA: adults should exercise in 10 minute bouts; kids don’t exercise as consistently in a period of time as adults, so the bouts need to be longer. (12-13)
- Important concepts about PA for children
 - “Young animals, including humans, are inherently active”. “If opportunities for activity involvement decrease, so will activity for people of all ages.” (13)
 - “Children usually have a relatively short attention span for tasks compared to adults”. “Long duration activities do not capture the attention of young children.” (13)
 - “Children are concrete rather than abstract thinkers.” (13)
 - “Children are typically active intermittently and need frequent periods of recovery.” (13)
 - “The relationship between PA and physical fitness is not strong in childhood and youth” In youth and children, age, maturation and heredity influence fitness scores more than activity levels. “Failure to meet comparative expectations even after persistence in activity can be a reason why some children and youth do not persist in activity.” (13)
 - “PA is a significant medium for learning for children and youth. Young children initially master their environment predominantly by learning to perform physical tasks.” (13)
 - “Many, if not most, of the skills used in adult recreation and leisure are learned during the school years.” (13)
 - “High intensity PA has benefits, but may reduce persistence among some people including children and youth.” (14)
 - “Inactive children and youth are more likely to become sedentary as adults than children and youth who are active.” (14)
 - “Self-efficacy (a feeling that you can be successful) in PA is one of the factors that is strongly associated with lifetime PA adherence.” (14)
 - “Children and youth who have active parents and family members and do regular activities with them are more likely to be active than those who are not active in the family setting.” (14)
 - “Just as children and youth can learn the habit of regular activity involvement; they can learn to be inactive if they are not given opportunities to be active when young.” (14)
- Exercise Prescription Model (1978, 1990, and 1998): based on adults, involved high intensity continuous activity, and therefore is not best for children. (14)
- Lifetime Activity Model of the 1980’s and 1990’s: used to determine PA levels for adults but can be modified for youth, suggests moderate activity accumulated over most days of the week can be beneficial to adults. (14-15)
- Recommendations for youth 6-12 differ from for youth older than 12: youth older than 12 should engage in 30 minutes of moderate activity per day and 20 minutes of vigorous PA for 20 minutes at least three days a week. (14-15)

- The PA pyramid divides PA into 5 types, and is specifically aimed at children. Lower levels on the pyramid should be performed more often. Younger children will do less sport related activity than older children. It is important that some of the activity overload the muscles in ways that promote flexibility and muscle fitness. (15-16)
- “In addition to PE, opportunities should be provided for children to participate in regular PA throughout the school day, i.e. recess and short activity periods.” (17)
- Customize activities to kids, so that they develop self-efficacy. “People dislike being coerced or manipulated by others” so voluntary exercise is more probably when people are motivated. (17)
- Expose youth to a variety of PA repeatedly. (18)
- Giving feedback for effort increases the likelihood less able youth will continue to be physically active. (18)
- Teach skills to improve self-efficacy, which increases later participation in PA. (18)
- Teachers should be active role models and discuss the benefits of being active in their life with their students. (18)
- Do not force kids to do things they don’t like or feel they can’t do, as negative feelings are hard to reverse and a negative feeling about one sport can lead to negative feelings about PA in general. (18-19)
- Promote activity outside of school, since most of the school day involves inactivity. (19)
- Activity traits that are associated with lifetime involvement: noncompetitive, the student chooses and wants to do, promote enjoyment, do not require a great deal of mental effort, can be done alone, promote a belief in the value of PA for improving health and general welfare, promote the belief that the activity will be easier and more meaningful over time, and help the participant avoid self criticism. (19)

Craig, S., Goldberg, J., and Dietz, W. H. (1996). Psychosocial Correlates of PA Among Fifth and Eighth graders. *Preventative Medicine*, 25 506-513.

- “Perceived behavioral control and attitude predicted children’s intent to participate. How much a child agreed s/he was good at doing vigorous activity predicted perceived behavioral control. In each grade, girls reported being less good at vigorous activity than did boys. Eighth-grade girls reported significantly fewer hours of vigorous activity than did eighth-grade boys.” (506)
- Study used questionnaire: “Adapted from a questionnaire based on the Theory of Reasoned Action, this instrument measured (a) the four domains of the Theory of Planned Behavior: (i) intent to participate in vigorous activity (ii) attitude toward engaging in vigorous activity, (iii) subjective norm, and (iv) perceived behavioral control; (b) control factors that might contribute to perceived behavioral control; and (c) additional variables: demographic variables and self reported participation in vigorous activity during the preceding year.” 507
- 310 students participated, 154 in grade 5, 151 in grade 8; 53% male 47% female; 44% white, 20% African American, 12% Hispanic, 8% Asian, 16% other; 84% lived in private homes and 16% lived in public housing. (510-511)
- “Our findings suggest that when a child feels competent at vigorous activity, or if it is fun and exciting, then s/he is more likely to engage in it. Enabling each child to participate in PA in which s/he may experience a sense of “being good at it” may offer

and important way to increase each child's perceived behavioral control in relation to vigorous activity." (511-512)

- "Children living in public housing reported greater perceived behavior control than did children living in private housing. As noted by someone who works in Cambridge housing projects, this may be due to access within some public housing projects to federally funded PA programs or reliance on bicycles for transportation." (512)
- "Gender differences in participation precede the ninth grade...gender differences in perception of competency are evident beginning in the fifth grade." (512)
- "More opportunities and support may exist for eighth-grade boys to participate in organized sports than for eighth-grade girls and may contribute to the difference in hours of vigorous activity." (512)

D

Davison, K. K. and Birch, L. L. (2001). Weight Status, Parent Reaction, and Self-concept in Five-year-old Girls. *Pediatrics*, 107, 46-53.

- "Girls with higher weight status reported lower body esteem and lower perceived cognitive ability than did girls with lower weight status. Independent of girl's weight status, higher paternal concern about child overweight was associated with lower perceived physical ability among girls; higher maternal concern about child overweight was associated with lower perceived physical and cognitive ability among girls. Finally higher maternal restriction of girl access to foods was associated with lower perceived physical and cognitive ability among girls with higher weight status but not among girls with lower weight status." (46)
- "As early as 5 years, lower self-concept is noted among girls with higher weight status. In addition, parents' concerns about their child's weight status and restriction of access to food are associated with negative self-evaluations among girls. Public health programs that raise parental awareness of childhood overweight without also providing constructive and blame-free alternatives for addressing child weight problems may be detrimental to children's mental health." (46)
- "Childhood overweight has been associated with numerous negative health and psychological outcomes including noninsulin-dependent diabetes, hypertension, sleep apnea, depression, and disturbed body image." (46)
- 197 five-year-old girls and parents (2 parent household, no other circumstances affecting food intake) from rural and non-rural areas of Pennsylvania, all non-Hispanic White. (47)
- 4 measures were used: Children completed the Pictorial Scale of Perceived Competence and Social Acceptability (PCSA) and the Body Esteem scale; neither are clinical scales so are not normed for healthy/unhealthy attitudes. Parents completed the Child Feeding Questionnaire (measured concern about overweight and restriction of food/feeding) and the General Parental Control Scale (GPCS). (47-48)
- Girls seem to be aware of "ideal" body types younger than previously thought, and fathers' perceptions of their body types also have a greater influence on young girls' body esteem than previously thought. There also seems to be "spillover" between different aspects of self-perception: girls with lower body-esteem also have lower perception of cognitive ability. Higher weight status was not correlated with lower perceived physical

ability; maternal concern about daughter's weight status was correlated with lower perceived physical ability. (50-52)

Dixey, R., Sahota, P., Atwal, S., Turner, A. (2001). Children talking about healthy eating: data from focus groups with 300 9-11-year-olds. British Nutrition Foundation, 26, 71-79.

- “The aim of this paper was to explore children's understanding of a healthy diet, the links between diet and health, what they think influences their healthy eating and their understanding of the relationship between fatness, thinness and health.” (71)

“This paper presents data from focus groups with 300 children (aged 9–11 years) in 10 schools in Leeds, England” (71)

“The conclusions for nutrition education programs in schools are that children need to be seen as more active participants in their own health education, and that help is needed to resist the pressures to be a socially desirable body weight.” (71)

There were three main themes in the discussions within the groups: “children's ideas about healthy eating and a balanced diet and the consequences of not eating healthily; children's views on what helps them to be healthy, particularly in relation to eating and taking exercise; and children's views on fatness, body shape and size.” (73)

E

Edwards, J., Hartwell, H. (2002). Fruit and vegetables – attitudes and knowledge of primary school children. British Dietetic Association Ltd., 15, 365-374.

- The objectives of this report are “To evaluate whether children, aged 8–11 years could correctly identify commonly available fruit and vegetables; to assess the acceptability of these; and to gain a broad understanding of children's perceptions of ‘healthy eating.’” (365)
- It was found that fruit was more popular among the children, and that different fruits were more accurately recognized. The children also realized that a healthy diet is important; however “the message has become confused.” (365)
- “If fresh fruit and vegetables are to form part of a balanced diet, the ‘health message’ needs to be clear. Fruit is well liked; vegetables are less acceptable with many being poorly recognized, factors which need to be addressed.” (365)
- The fruits that were used were apples, oranges, bananas, grapes, melons, pears, and kiwi fruits.
- The vegetables used were broccoli, carrots, cabbage, cauliflower, peas, tomatoes, and sweet corn.
- “A number of children reported not having tried various fruit and vegetables although the overall totals declined with age. Whilst fruit and vegetables were reported as not having being tried across the age range, two children claimed never to eat any fruit and vegetables at home.” (369)
- “Grapes received the highest ratings; this was followed by apples. Melon, although not well recognized, received high ratings from those who had tried them.” (369)
- “When asked the meaning of the term “healthy eating”, various suggestions were offered. The majority of children (52%) identified the term as being related both to eating a balanced diet and the consumption of fruit and vegetables.” (370)

- “When asked why it is important to eat fruits and vegetables, two themes emerged: to keep you healthy (62%) and to provide the vitamins needed for a healthy life (17%).” (370)

F G

Glazer, C. 2003. PA and Afterschool Programs: Potential Allies in Combating Obesity in Low-Income Communities (A concept paper for the Task Force on Childhood Obesity Robert Wood Johnson Foundation: DRAFT)

- More low SES kids are obese than middle or high SES kids. (2-3)
- “There is some evidence that these sedentary activities stimulate eating high calories snacks.” (3)
- “In some (particularly immigrant) communities, sports and PA are seen as frivolous, an unaffordable luxury compared to academics, work that can contribute to family income, and caring for younger siblings.” (4)
- Urban outdoor play places are dangerous or not maintained, and PE and recess are not frequent in low SES schools. (5)
- Kids in sports give parents the opportunity to be more involved in the lives of their children and their community. (5)
- After school programs reduce risky juvenile behaviors by giving them more supervised time. (6)
- Sports after school attracts youth, and things to do after school would reportedly reduce TV and computer/video game usage. (6)
- Many after school programs focus on academics and restrict PA. (8)
- After school programs are ideal for including PA because they are more flexible, can cooperate with community organizations, and are not as full as schools. (9)

Gunnarsdottir, I., Thorsdottir, I. (2010). Should we use popular brands to promote healthy eating among children? Public Health Nutrition.

- “The aim of the present study was to assess whether children perceive food to taste better with a LazyTown [a popular Icelandic TV show] label on the wrapping compared with the original packaging.” (1)
- This was a pilot study that was carried out in three preschools in Iceland.
- “Between 27 and 42% (depending on the product) of children preferred the taste of LazyTown food and beverages despite the fact that the test food was identical.” (1)
- “Up to 89% of foods specifically targeted at children can be classified as of poor nutritional quality.” (1)
- “Popular brands could be useful to promote healthy eating among young children along with other actions.” (1)

H

Hadley, A., Hair, E., Dreisbach, N. (2010). What Works for the Prevention and Treatment of Obesity Among Children: Lessons from Experimental Evaluations of Programs and Interventions. Child Trends, 07.

- “This fact sheet synthesizes the findings from multiple studies that implemented random assignment experimental evaluations to examine the impacts of various intervention strategies on child obesity outcomes” (1)
- “All of the reviewed programs targeted child, adolescent, and/or youth samples—ranging from one to 19 years of age—and measured a combination of nutrition, physical activity, and/or weight loss outcomes.”(1)
- “Results from the synthesis suggest that programs with narrow goals and those that specifically target obese and/or overweight children are more likely to be effective at impacting at least one obesity-related outcome. Furthermore, success on some outcomes was linked to participant age: physical activity programs tended to be effective for adolescents 12-17 years of age, and weight loss programs tended to be effective for older adolescents 16-19 years of age. Program length played an important role in some cases, as long-term physical activity programs were successful. Additionally, a number of intervention strategies were associated with success on particular outcomes. Specifically, therapy/counseling was linked to improved nutrition and physical activity” (1)
- “Programs with narrower goals were generally more successful in achieving the specific desired behavioral improvements. Eight out of the 15 programs¹¹ that focused solely on nutrition, on physical activity, or on weight loss demonstrated an impact on the targeted outcome. In contrast, only two of 20 programs that *simultaneously* targeted nutrition, physical activity, and weight loss were successful at influencing all of these outcomes.” (2)
- “Programs that teach participants how to develop action plans, such as exercise schedules and restricted diets, were not associated with consistently positive impacts for children or teens.” (3)
- “Programs addressing nutrition, physical activity, and weight loss in the same program did not have positive impacts on all three of these outcomes.” (4)
- “Obesity programs geared towards young children were not generally effective.”(4)
- “The ideal format for a successful, comprehensive obesity prevention program is still unclear. A variety of program components and settings can combine in order to produce positive outcomes.”(5)
- “It appears that the ideal obesity program should have a targeted focus. Programs that focus on only nutrition, physical activity, or weight loss tend to be more successful than those that simultaneously focus on all three outcome categories.” (5)
- “Programs that are targeting one outcome should consider the strategies that are associated with success on that specific indicator.”(5)
- This fact sheet also displays a table of which programs were found to work, found to have mixed results, and found not to work for nutrition, PA, and weight loss. (7, 8, 9, 10, 11, 12)

Hagger, M., Cale, L., and Ashford, B. (1997). Children’s PA Levels and Attitudes Towards PA. European PE Review, 3, 144-164.

- “One variable which has had a great impact on the study of PA behavior is attitude.” (145)
- “There has been...a dearth of research examining the relationship between attitudes towards PA and PA behavior in children aged below 12 years.” (145)

- Children's Attitudes towards PA (CATPA) inventory used to measure attitudes toward PA. (145)
- Theory of Reasoned Action (TRA) used with adults to determine Attitude toward the act (Act) and subjective norm (SN); successfully predicted 58% of variance in children. (145-146)
- "The primary purpose of this preliminary study was to examine the influence of attitude variables from two different theoretical approaches, the CATPA and the TRA, on PA behavior in a sample of primary school children. A secondary aim of this investigation was to compare season and gender levels of PA as measured by self-report in primary school children." (146)
- 45 children (25 boys, 19 girls) aged 9-11 years from North Staffordshire. (147)
- Interviewer administered self-report measuring PA; questionnaires were administered over two weeks, once in summer once in winter. (147)
- "Results from the present study suggest that children do not participate in a high level of PA in terms of daily energy expenditure. However, the children did spend a considerable amount of time engaged in 'moderate' activity." (153)
- Children are more active in summer than winter. There was no gender difference found in this study. (153-154)
- "Therefore, while no gender differences in PA were found in the present sample, who are typically younger than samples used in previous studies, such differences may emerge as children get older and become 'socialized' into gender roles for PA. (154)
- "The children exhibited positive attitudes towards PA." (154)
- The results of this study are different than other studies: this one found no gender differences and found the CATPA scales to be better predictive measures of PA than the TRA. The researchers predict that this is because the other studies used different measures of PA, which are less reliable measures of PA. (154-156)
- The correlation of the CATPA scales to levels of PA indicates the importance of attitude to PA; even in young children, positive attitude is correlated with more PA. (157)

Halpern, R. Physical (In) activity Among Low-Income Children and Youth: Problem, Prospect, Challenge.

- Little kids move a lot, naturally. Older kids don't move as much naturally, but can be influenced by social learning (parents, peers, family, and community members) and identity disorder. Older boys and girls have differences in PA: boys are competitive, girls are goal oriented. Boys use large spaces and fixed games, girls use smaller spaces more flexibly. (3)
- Low-income children are more restricted in being allowed to play outside, organized sports are seen as remedial and interventions rather than necessary normal support for growing kids, and neighborhoods are often unsafe, restricting outside play. (3-4)
- "Ego-involved adolescents (those focused on winning and losing as measures of self-worth) appeared to get less satisfaction out of sports participation than mastery-oriented ones (those focused on their own progress and performance)." (4)
- PA reduces anxiety and stress, possibly depression, helps kids cope with anger and pain, helps with socialization, and can be a source of self-expression and creativity. (4)

- “Obesity also causes or contributes to psychological problems, including depression, social discrimination and social withdrawal.” (5)
- “The earlier decline of childhood pursuits is attributable, in part, to the fact that more low- and moderate-income American children are spending more time in institutional settings during non-school hours than in the past.” Afterschool programs with sedentary activities like doing homework or crafts, as well as programs lacking space for spontaneity and physicality, contribute to the problem of physically inactive youth. (7)
- Boys, particularly low-income and minority boys are restricted by social focus and concern regarding aggression, bullying, rowdiness and restlessness. Girls constraints on PA “include lack of role models, social pressures, body image issues, lack of parental encouragement (important, in part, because girls reportedly rely more than boys on such encouragement), and fewer sports choices.” (7-8)
- Low-income parents don’t focus on PA as important. Low income children often have family responsibilities, which reduces their time to be physically active. Low-income parents also work long hours which reduces their ability to act as “social agents” for their children. (8)
- First 2/3 of the 20th century children played outside in cities despite the risks. They developed and passed on their own games and governments, learned self-confidence, social skills, and quickness of mind. In the last third of the century, out door play became more risky, and has declined. Drugs, lack of adult supervision, and other problems restrict children’s ability to safely play outside. (9-10)
- Children are playing computer games and watching TV more. Commercials on TV are aimed at kids, telling them what to look like, wear, eat, buy, etc. Boys are using steroids which may inhibit development to emulate the bodies they see on TV and in magazines. Food subsidiaries of tobacco companies use advertising techniques previously found effective in marketing cigarettes to kids. High school students work after school, limiting time for PA, and much of that work is driven by consumerism not family need. (10-11)
- Low-income schools reduce or eliminate recess and PE; they also extend remedial education into after school hours. (12)
- “The United States lacks any deliberate, coherent public vision or the supports – and protection – youth are entitled to as citizens and community members.” The government ignores environmental health threats both indoors and out in low-income neighborhoods, inhospitable urban planning restricts play areas of kids, municipal recreation budgets have been cut, so park and recreation facilities have lost staff and gone unrepaired. (13)
- The problem of youth physical inactivity falls fairly low on the list of important things for the government to fix. (15-16)
- Afterschool programs are more flexible than school hours and are good places to try to improve kids’ PA. After school programs can also combine boys and girls into the same physical activities. (16-17)
- Sports are social activities that involve PA. Expanding organized sports for kids is beneficial, and gets the community involved. Also, experience with sports in middle childhood helps with self esteem. The number one reason kids get involved in sports is to have fun, which is something adults forget. Low-income parents worry about financial costs, but often have an exaggerated sense of them or don’t realize funds can be available elsewhere. (17-19)

- Europe has play time during school, unstructured playgrounds, and recognizes that commercializing and professionalizing sports can have negative effects. (21)

I

Institute of Medicine of National Academies. (2006). Progress in Preventing Childhood Obesity: How Do We Measure up? Report brief.

- 1/3 of American youth are or will be at risk of being obese. (1)
- “There is a substantial underinvestment of resources to adequately address the scope of the obesity crisis.” (1)
- “Interventions, however, generally remain fragmented and small scale. Moreover, the lack of systematic monitoring and evaluation have hindered the development of an evidence base to identify, apply, and disseminate lessons learned and support promising childhood obesity prevention efforts.” (1)
- Government, industries, communities, schools, and families need to give money, effort, time and oversight to programs which are intended to reduce childhood obesity. The oversight needs to include an evaluation of the success of practices, and if the practices are successful, a means of disseminating what worked (or if unsuccessful, disseminating what didn’t work). (2-3)

J

K

Kelder, S., Hoelscher, D., Barroso, C., Walker, J., Cribb, P., Hu, S. (2005). The CATCH Kids Club: a pilot after-school study for improving elementary students’ nutrition and PA. Public Health Nutrition (Cambridge University Press), 8, 133-140.

- “The purpose of this paper is to report on a pilot study of an after school adaptation of the CATCH elementary school program called the CATCH Kids Club.”
- “Evaluation consisted of direct observation of moderate to vigorous PA during play time, self-reported food intake and PA, and focus group interviews with after-school program staff.”
- “Students responded well to the PA and snack components and were less interested in the 5-module education component. Routine staff training was a key variable in achieving proper implementation.”
- “Strong and significant effects were observed for the PA but not for the educational component. The results of the physical education component suggest that it is feasible, effective and ready for larger scale evaluation or dissemination.”

Kimm, S. Y. S., Glynn, N. W., Kriska, A. M., Barton, B. A., Kronsberg, S. S., Daniels, S. R., Crawford, P. B., Sabry, Z. I, and Liu, K. (2002) Decline in PA in Black Girls and White Girls During Adolescence. The New England Journal of Medicine, 347, 709-715.

- “1213 black girls and 1166 white girls enrolled in the National Heart, Lung, and Blood Institute Growth and Health Study from the ages of 9 or 10 to the ages of 18 or 19 years. We used a validated questionnaire to measure leisure-time PA on the basis of metabolic equivalents (MET) for reported activities and their frequency in MET-times per week; a higher score indicated greater activity.” (1)

- “By the age of 16 or 17 years, 56 percent of the black girls and 31 percent of the white girls reported no habitual leisure-time activity. Lower levels of parental education were associated with greater decline in activity for white girls at both younger ages ($P<0.001$) and older ages ($P=0.005$); for black girls, this association was seen only at the older ages ($P=0.04$). Pregnancy was associated with decline in activity among black girls ($P<0.001$) but not among white girls, whereas cigarette smoking was associated with decline in activity among white girls ($P<0.001$). A higher body-mass index was associated with greater decline in activity among girls of both races ($P\leq 0.05$).” (1-2)
- “Although the decline in our study began at the outset of adolescence, its rate accelerated so that by the ages of 18 and 19 years, the majority of the girls engaged in virtually no habitual physical activities other than those performed during school.” (7)
- “Race was a factor, with black girls having a decline in activity twice that of white girls. Behavioral risk factors such as smoking (for white girls) and pregnancy (for black girls) also affected the decline in activity. Although information on the correlates of decline in activity among adults is limited, both childbirth (in Swedish women) and cigarette smoking (in U.S. men and women) have been found to be significant risk factors for inactivity and for a decline in leisure-time activities.” (7)
- “Heavier girls of both races also had a greater decline in activity than less heavy girls.” (7)
- “In our study, living in a single-parent household was a risk factor for a decline in activity among older white girls but not older black girls.” (7)
- “The relation between parental education and decline in PA differed according to race. For white girls, the level of parental education was inversely associated with the decline in activity throughout adolescence but became less pronounced at older ages. This observation suggests that as white girls get older, PA may become more self-motivated and less influenced by parents. In contrast, for black girls, an inverse association between parental education and decline in activity was manifested only at older ages.” (7)
- “Annual household income, although generally correlated with educational level, was not associated with the decline in activity.” (7)
- “The effect of education on activity among adolescent girls in this study and among U.S. women, regardless of race, suggests that educational under-attainment has an important role in the development of sedentary lifestyles.” (8)

L

Lewis, B. A., Marcus, B. H., Pate, R. R., and Dunn, A. L. (2002). Psychosocial Mediators of PA Behavior Among Adults and Children. *American Journal of Preventative Medicine*, 23, 26-35.

- The authors conducted a meta-analysis of studies on PA interventions of adults or children. (26)
- This article is promoting a certain method of measuring mediators to PA. Mediators are defined as “intervening causal variables that are necessary to complete a cause-effect pathway between an intervention and PA.” (26)
- The method they promote is “suggested by Baron and Kenny. According to Baron and Kenny, a variable mediates the relationship between an intervention and an outcome if a positive relationship between the intervention and an outcome variable is attenuated after statistically controlling for the mediator.” (27)

- “Perfect mediation occurs when the intervention has no effect on PA behavior when controlling for changes in...the mediator.” (27)
- Analysis using the proposed method is only possible for real experiments with a control group, studied longitudinally, in which there is a difference between outcomes for the intervention and control groups. (33)

Lindquist, C. H., Reynolds, K. D., Goran, M. I. (1999). Sociocultural Determinants of PA Among Children. *Preventative Medicine*, 29, 305-312.

- A cross sectional sample of African American and Caucasian children was studied using physical tests and self report surveys. (306)
- Author’s premise: things which influence children’s PA can be divided into four levels of determinants “the physiological level, including factors such as maturation and growth, the psychological level, including motivation, self efficacy, and sense of control, the sociocultural level, including family characteristics, sociodemographics, role models, and the ecological level, including the availability of facilities for activity, physical safety, and climate.” (305)
- Ethnicity is presumed to influence PA among kids, “with levels being higher among Caucasian than African American or Hispanic children in terms of self-report and physical fitness.” (306)
- Social class could be confounded with ethnicity. (306)
- Result: PA is a multidimensional construct. (310)
- “Rather than emerging as an activity competing with exercise...television viewing appears to be a behavior independent from exercise, since children who watch more television do not necessarily engage in less PA.” (310)
- “The lack of gender differences observed among our sample may be due to the effects of controlling for pubertal development. The majority of previous studies reporting lower levels of activity among females have not considered the confounding influence of pubertal development, which typically occurs at an age for females and may adversely affect levels of PA. This possibility was suggested in this paper by the negative relationship between pubertal development and sports team participation.” There was no change in other reported activity levels based on age. (311)
- The only effect of ethnicity found was in amount of exercise time during school; African Americans received about 20 minutes less time. This difference “may reflect the persisting racial segregation and poor quality of schools attended primarily by minority children common in Southern states.” (311)
- Single parenthood results in more television watching, less exercise in school time, and more days per week of PA. Minority children are more likely to have single parents than Caucasian children are. (311)

M

MMS Education. (2008). *Helping Youth Make Better Food Choices: Perceptions, Barriers and Promising Approaches Among Nutrition, Health and Public Health Professionals*. Action For Healthy Kids, 1-20.

- “The purpose of this Action for Healthy Kids research project was to collect baseline data from health, public health and nutrition professionals on the front lines of the effort to counsel and support youth in making food choices consistent with the 2005 *Dietary Guidelines*. Survey respondents provided vital information on: Their personal perspectives on the current nutrition recommendations outlined in the 2005 *Dietary Guidelines*’ Food Groups to Encourage. The barriers they have encountered in helping children and youth to make more healthful food choices. Their individual preferences and habits in recommending food groups when assisting youth to make better food choices. Their perceptions about why youth do not make better food choices—and the greatest potential influencers in changing these conditions. Their own ‘best practice’ approaches and strategies for helping youth make food choices in keeping with the 2005 *Dietary Guidelines*” (2)

Martin, L., Milot, A. (2007). Assessing the Diet, Exercise, Body Image, and Weight of Adolescents: A Guide for Out-of-School Time Program Practitioners. Child Trends, 06.

- “This brief discusses diet, exercise, body image, and weight and also provides information for practitioners on how to measure these factors among youth in their program.” (1)
- “Regardless of their actual weight, some adolescents, and in particular female adolescents, have an intense desire to be thin, leading in some cases to an eating disorder. Since both unhealthy weight loss and unhealthy weight gain are problems among today’s adolescents, it is important to be aware of and sensitive to both sides of the issue when working with young people.”(1)
- This article also discusses what it means to be overweight as well as the risks and issues that overweight youth face (both physically and mentally).
- Body Mass Index (BMI) is also discussed, and a website is given to calculate BMI.
- Body image and eating disorders are addressed. Specifically, anorexia nervosa and bulimia nervosa are discussed.
- “Body image refers to how an individual views his or her body shape and weight. Individuals who have a poor body image may believe that they are overweight, even if they are not. Eating disorders occur when a person has a poor body image and does dangerous things to control his or her weight, such as not eating or vomiting after eating. In the most severe cases, eating disorders can cause death.” (1)
- This brief has a section called “What to do if you suspect that someone in your program is suffering from an eating disorder,” (2) and another section called “Assessing weight issues among adolescents in out-of-school time programs.
- A list of additional resources is provided.

McMurray, R.G., Harrell, J. S., Bangdiwala, S. I., and Hu, J. (2003). Tracking of PA and Aerobic Power from Childhood through Adolescence. Medicine and Science in Sports and Exercise, 35, 1914-1922.

- A study of 529 girls and 535 boys measured three times over seven years for PA and aerobic power (VO2Max). The aerobic power was measured and the PA data was retrieved from surveys. The study also looked at race as an influencing factor for changes in PA and aerobic power (African American and Caucasian American).

- Used data from participants in the Cardiovascular Health in Children Study (CHIC), which is “a longitudinal study that evaluated the development and trajectories of cardiovascular disease risk factors in youth and adolescence.” (2/11)
- “PA levels were reduced by about 48-53% for both the girls and boys, whereas aerobic power declined by approximately 18% for the girls and 7% for the boys.” (4/11)
- “The elementary schools in our study had both recess and PE classes, whereas in our middle schools (grades 6-8) there was no recess and PE was limited. The high schools required only two semesters over 4yr and the emphasis was on competition and high-level performance.” (4/11)
- “Aerobic power and PA levels decline from childhood through adolescence, aerobic power tracks better than PA levels. African-American girls who are low fit (low VO [sub2max]) have a greater tendency to remain low fit as they age. Initially, low-fit African-American boys tend to maintain their VO [sub2max] levels as they age, and because VO [sub2max] generally declines with age, their rank order increases in the population, moving them to a higher fitness group. With regard to PA levels, there appears to be similar stability for Caucasian and African-American girls, but African-American boys have a greater tendency to maintain, or possibly increase, activity levels as they age. In addition, highly active African-American boys tend to remain highly active. Thus, in general, it appears that inactive and unfit youth become more inactive and unfit teenagers, particularly African-American girls. The positive finding of this study is that tracking is only moderate, suggesting that change is possible.” (7/11)

N

NIH News. (2003) Study Suggests Schools Lacking in Exercise Programs for Children.

- “America's young children may not be getting enough vigorous physical exercise through their schools' physical education (PE) programs, suggests the latest analysis by the National Institute of Child Health and Human Development (NICHD) Study of Early Child Care and Youth Development.” (1)
- “Briefly, the third grade children in the study received an average of 25 minutes per week in school of moderate to vigorous activity. Experts in the U.S. have recommended that young people should participate in physical activity of at least moderate intensity for 30 to 60 minutes each day.” (1)
- “The current analysis, of school PE activities for third graders taking part in the NICHD Study of Early Child Care, appears in the February Archives of Pediatrics and Adolescent Medicine.” (1)
- “NICHD Study of Early Child Care and Youth Development enrolled just over 1,300 children at birth at 10 research sites throughout the United States. The researchers conduct periodic observations and evaluations of many aspects of the children's lives as they progress from infancy through adolescence.” (1)
- “Observations conducted in PE classes provided insight into the amount and types of PE programs offered to 814 third graders at 648 U.S. schools across the country. Observers tracked the activity of a child as he or she participated in school PE classes. The observers used the following categories to describe the activities in each class
Management — teachers' activities related to preparing the children for an activity, such as forming a line or moving from one location to another; Knowledge — teachers'

explanations pertaining to the activity about to take place, such as explaining the rules of a game; Fitness — structured physical exercises, such as calisthenics; Skill Practice — learning a skill essential to an activity, such as dribbling a basketball; Game play — games or sports, such as softball or basketball; Free play — allowing the children to engage in unstructured activity.” (2)

- “PE programs vary greatly at the state and local level, with allotted time for classes ranging from 30 minutes per week to 150 minutes per week. Fears that increasing physical activity might have a negative impact on academic performance are unfounded, according to the authors. Earlier studies, published by others, had shown that increasing the length of time in PE classes and the intensity of physical activity in the classes did not have a detrimental effect on academic achievement.” (2)
- “reiterated findings by other researchers that boys spent a greater percentage of class time in moderate to vigorous physical activity (38.3 percent) than did girls (35.6 percent).” (2)

Nader, P. R. et. Al. (2006). Identifying Risk for Obesity in Early Childhood. *Pediatrics*, 118, e594-e601.

- The article presented “growth data from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development, a longitudinal sample of 1042 healthy US children in 10 locations.” (e594)
- “Children with BMIs >85th percentile, as well as with BMIs in the high reference range are more likely than children whose BMI is <50th percentile to continue to gain weight and reach overweight status by adolescence.” (e595)
- The study looked longitudinally at BMI’s of a group of kids at ages 24, 36, 54 months, as well as ages 7, 9, 11, 12 years. BMI’s >85th percentile are considered overweight, BMI’s >95th percentile are considered obese. Children who had BMI >85 percentile at any point during the preschool ages (24, 36, 54 months) were more than 5 times as likely to be overweight or obese at age 12. (e597-e598)
- No gender difference was found in predictive effect of earlier BMI on later BMI (e597-e598)

The National Institute of Child Health and Human Development Study of Early Child Care and Youth Development Network. (2003). Frequency and Intensity of Activity of Third-grade Children in PE. *Archives of Pediatrics and Adolescent Medicine*, 157, 185-190.

- This study observed children in one PE class. (185)
- There are concerning trends of obesity and type 2 diabetes in kids. (185)
- Various studies have found children, particularly boys, are more active during recess than PE class. (185)
- Some studies have found that the amount of activity in PE classes depends on whether it is a PE specialist or a regular classroom teacher teaching the class; PE teachers have more active classes. (185)
- The current study, however, found no difference between the types of teacher in terms of activity level. PE teachers spent more time on knowledge and skill practice, but less time in game play. These differences in class activity resulted in equal energy expenditure between the two types of teachers. (188)
- As expected, boys spent more time in active play and thus had higher energy expenditures. (188)

- Kids are not active enough, and better PE classes would help, as would more time spent in PE classes. Efforts need to focus on getting girls involved. (189)

O

Oldewage-Theron, W., Egal, A. (2009). The Evaluation of a Nutrition Education Programme on the Nutrition Knowledge of Children Aged Six and Seven Years. *Journal of Family Ecology and Consumer Sciences*, 37, 45-51.

- This report discusses the strong impact that a nutrition education program can have on children. It proves that such a program can really have an effect on the children.
- “Blom-Hoffman and colleagues (2004) have highlighted the importance of nutrition education program that include aspects of change in both knowledge and behavior.” (45)
- “Both research and clinical experience suggests that incorporation of problem-solving techniques in nutrition education will increase long-term change in nutrition behaviors. Therefore, nutrition education tools should provide interactive and problem-solving activities such as food plate puzzles where children can replace food items in the same food group to construct a balanced meal. Furthermore, word searches, cross word puzzles, and matching food game items to food groups can also be included as was done in this study.” (45)
- “The main aim of this study was to evaluate the effect of a nutrition education program in the nutrition knowledge of pre-primary school children, aged six and seven years old.” (46)
- “The specific objective was to test if learning took place through the implementation of a nutrition education program, using specific developed nutrition education tools.” (46)
- “In general, the program was well received by both the children and the teachers.” (49)
- “The nutrition education program proved to be successful in teaching the children about the various food items forming part of each of the food groups, as most of the responses improved significantly after the nutrition education program intervention.” (49)
- “Although it is believed that younger children do not make their own food choices, the nutrition education program implemented in this study made a significant contribution to the nutrition knowledge of the children when it was measured directly after completing the eight-month nutrition education program.” (49)

P

Pangrazi, R.P, Beighle, A., Vehige, T., and Vack, C. (2003). Impact of Promoting Lifestyle Activity for Youth (PLAY) on Children’s PA. *Journal of School Health*, 73, 317-321.

- This study, involving 35 Arizona schools and using recorded pedometer step counts and BMI, was conducted to evaluate the effect of PLAY in fourth graders.
- PLAY (Promoting Lifestyle Activity for Youth) combined with PE resulted in higher activity levels in girls than no structured or encouraged activity. (320-321)
- “School health programs, by implementing a simple 15 minute activity break that emphasizes PA and encourages students to monitor their own PA, can positively influence the health of students.” (321)

Poest, C. A., Williams, J.R., Witt, D. D., and Atwood, M. E. (1989). PA Patterns of Preschool Children. *Early Childhood Research Quarterly*, 4, 367-376.

- “The results of the analyses indicated that (a) preschool children are not engaged in vigorous activity year round ($p<.01$); (b) boys are more physically active than girls ($p<.05$); (c) children in nursery school are more physically active than children in day care ($p<.01$); (d) parents involved in year-round physical exercise are more likely to have children who are involved in physical exercise year round ($p<.05$); and (e) teachers trained in early childhood education spent more instructional time in motor development than those teachers trained in other areas ($p<.01$).” (367)
- Muscle mass has been worrisome in 6-17 year olds since the 1950’s, and no one has really studied PA among preschoolers, because they focus on intellectual and social development instead. (367-368)
- Data was collected via questionnaires on large motor activities, parents’ participation in physical fitness activities, parents’ attitudes about physical fitness, and school environment regarding available equipment for physical fitness and attitudes from teachers about motor development. Data was collected from 514 children and 46 teachers (269 boys, 245 girls; 279 in nursery schools, 235 in day care centers). (369)
- “Although the attitude of parents toward motor development and physical fitness of preschool children did not vary significantly with the physical activity patterns of preschool children, the amount of time parents spent in physical exercise did correlate significantly.” (371)
- “Teachers in this study with a 2-year degree in early childhood education spent significantly more instructional time on movement activities than those trained in elementary education.” (372)
- Teachers commented that “the majority of the children were active for the first 5 to 10 minutes of large muscle time and then engaged in pretend play for the remaining 25 to 60 minutes. Initial research has also shown that when children are engaged in regular aerobic activity and motor skill instruction their activity patterns improve significantly not only during the special PA classes but also during their free time.” (372)
- There is a lack of education about motor development as many teachers think that free play equipment allows the motor skills to develop naturally and that is adequate. (373)

Policy Studies Associates, Inc. (2006). *Everyone Plays! A Review of Research on the Integration of Sports and PA into Out-of-School Time Programs*.

- On the concept of youth development: “Both research and practice came to view young people as having assets and skills that could be nurtured, developed, and helped to flourish given the right environmental supports and opportunities. This perspective focuses on what children need to promote their healthy development.” (3)
- “Most research on youth sports and PA has focused on high school team sports. These activities emphasize competition and winning, and they focus on older teens. As a result, they differ significantly from OST programs that aim to reach all children, including those who are not athletically inclined. By the time most youth reach high school, their sports and PA patterns are likely to be set. Also, as the research on youth PA shows, many children are not comfortable with competitive sports.” (4)
- “The direction of causal relationship among physical inactivity, low fitness levels, and obesity is a giant unknown.” (4)

- “Approximately one-third of students take a school bus, and half ride in private vehicles (U.S. Department of Transportation, 1997). The effects of these trends appeared in a study in which sixth-grade girls who lived furthest from school were found to spend the least amount of time in PA (Cohen, Ashwood, Scott, Overton, Evenson, Voorhees, Bedimo-Rung, 2004).” (5)
- “Less than one in five middle and junior high schools required daily PA for all students. Nationally, only Illinois mandates PE classes across grades K-12 (O’Shea, 2005).” (5)
- “In one study, girls who lived within a half-mile radius from a park engaged in 26 more minutes of moderate-to-vigorous activity a week than did girls who did not live near a park (Cohen, Ashwood, Scott, Overton, Evenson, Voorhees, Staten, McKenzie, & Bedimo-Rung, 2005).” (6)
- Play spaces are more common in urban areas than rural areas. PA is higher among girls who live near play spaces than those who do not. (6)
- Studies have conflicting results on whether or not TV viewing inhibits time and interest in PA for kids. (6)
- “While girls’ PA declines across racial and ethnic subgroups as they enter their teens, studies show that this is especially true for black girls, compared with white girls.” (7)
- “Two parent households are better able to marshal funds for transportation and equipment, and they require less help from children with chores and caring for younger siblings.” (8)
- Parents who are active, encourage their children in PA, and engage in PA with them increase the likelihood that the child will be physically active. (8-9)
- Children who believe they can’t do sports or are shy are less likely to join sports groups and more likely to be physically inactive. (9)
- “In terms of weight control, findings show that PA without attention to healthy nutrition may prevent weight gain but does not necessarily produce weight loss.” (9)
- “Sports participants were more likely than nonparticipants to report eating fruits and vegetables the previous day, and less likely to report smoking cigarettes, using cocaine or other illegal drugs, or contemplating suicide. However, female sports participants were more likely than nonparticipants to report having sexual intercourse in the past three months. Athletes and non-athletes were just as likely to eat foods high in fat, have one or more binge drinking episodes during the past month, get involved in a physical fight, vomit or use laxative to lose or control weight.” (10)
- “Children and youth who exhibit a belief in their capacity to learn, change or maintain a skill or behavior will also believe that they are capable of sprinting across the finish line or jumping Double Dutch.” (10)
- “Boys with low self-esteem who joined a baseball team showed higher levels of self-esteem after working with baseball coaches who gave feedback, were non-punitive and encouraging, and provided high-quality technical instruction.” (11)
- “Videon (2002) found that girls who play sports perform significantly better in school than do boys who play sports. These girls had fewer unexcused absences, took more core courses, had higher grade-point averages, and held higher expectations for college.” (11)
- “Other research (Ryska, 2003) found that when students’ identities were wrapped up in sports, and, when personal autonomy was low, their scholastic competence was low as well. However, sports involvement that was characterized by a task orientation, social

identification with a sport, and relative autonomy appeared to be associated with greater scholastic competence among both male and female student athletes.” (11)

- “But probing deeper, the researchers discovered that the decrease was due to these adolescents participating in fewer activities as they got older, not the time they spent on any one activity. In fact, adolescents who kept up an activity as they became older devoted either the same amount of time on it as they had earlier or even more. The implication of this for designing PA programs for children and youth, the researchers explain, is that it may be critical to expose preadolescent children to as many activities as possible, in order to increase the likelihood that they continue to participate in some of them in later years.” (14)
- “Making participants sit out PA because of bad behavior can convey to young people that their PA is not that important after all.” (15)
- Trained coaches are better liked, more encouraging, give positive reinforcement and encouragement. (16)

President’s Council on Physical Fitness and Sports. (2000). Motivating Kids in PA. Research Digest, 3, 11.

- “The focus on the consequences of PA precludes an understanding of the determinants of PA behavior. That is, what motivates children and teenager to continue and sustain PA levels ...Keeping kids motivated to participate in PA will then naturally lead to touted health outcomes.” (1)
- “Research...consistently points to three major motives....First, youths want to develop and demonstrate physical competence, such as athletic skills, physical fitness, and physical appearance. Second, gaining social acceptance and support, including friendships, peer group acceptance, and approval, reinforcement and encouragement by significant adults (parents, teachers, and coaches) is key to initiating and continuing participation. Third, fun derived from participation maximizes positive and minimizes negative experiences related to PA. Enjoyment is likely to enhance the attractiveness of the current activity and decrease the appeal of alternative activities.” (1)
- “Considerable evidence shows that youth who report stronger beliefs about their physical competencies are more likely to enjoy activity and sustain interest in continuing involvement than children who report lower levels of physical competence.” (2)
- “In particular, creating an environment that will enhance children’s perceived competence, and helping children help themselves by providing them with self regulation skills (e.g., goal setting) that allow them to independently enhance their own perceptions should translate to greater enjoyment, self-esteem, motivation, and PA behavior.” (2)
- “In commitment studies conducted thus far, enjoyment has consistently emerged as the strongest predictor of children’s and adolescents’ resolve to continue sport and PA involvement.” (3)
- Parental encouragement of PA “varied by gender: parents gave more encouragement to their sons than daughters, and girls reported lower perceived physical competence and positive affect toward PA than did boys.” (3)
- “Kimiecik and Horn (1998) found that parent-reported MVPA [moderate to vigorous PA] was not related to child’s MVPA (i.e., no support for role modeling effects), but parents’ competency beliefs for their child were significantly related to the child’s MVPA.” (3)

- “For females, a mastery motivational climate (teacher emphasized skill learning over competition) and a non-directive teaching style (teacher allowed students choices in their activities) positively influenced perceptions of physical competence, a task goal orientation (defining success in self-referenced ways), and perceptions of autonomy. In turn, self-perceptions were strong predictors of intrinsic motivation and PA behaviors (e.g., effort and persistence).” (4)
- “Both female and male youths who reported they had a close friend in sports or PA felt better about themselves physically, liked PA and sports more, were motivated by challenging activities, and were more physically active.” (4)
- “Provide optimal challenges. An optimal challenge is one that matches the difficulty level of activities to the child’s capabilities.” (5)
- “Create a mastery motivational climate. A mastery motivational climate is one that promotes learning, effort, and self-improvement, and mistakes are viewed as part of the learning process.”
- “Make PA fun...high action and scoring, high personal involvement in the action, close games, and opportunities to affirm friendship are key to activity enjoyment...change of pace activities...and allowing children some choices in activity selection are also key.” (5)
- “Help children help themselves...competence beliefs...influence levels of self-esteem, enjoyment, motivation, and PA levels. Thus, teaching children self-regulated learning strategies such as goal setting and self-monitoring allows them to adopt self-reliant standards for enhancing their perceptions of competence.” (5)

Q R

Robert Wood Johnson Foundation. (2007). Recess rules: Why the Undervalued Playtime May be America’s Best Investment for Healthy Kids and Healthy Schools

- “Recess offers nearly half of the available opportunity to promote PA among kids during the school year. Trying to improve children’s health without focusing on recess forfeits our best chance for reaching students with the greatest need.” (2)
- “The most vulnerable kids – those who come from minority or low-income families – are being shortchanged when it comes to recess.” (2)
- “Unlike P.E. and after-school programs, there is very little dedicated funding available to improve the quality of recess.” (2)
- “[Kids] don’t know how to make up and follow the rules or how to resolve conflicts. Too often, games end in a fight – and more complicated games break down before they can really get going. Most kids end up on the sidelines, disengaged. And when this behavior is carried over...into the classroom, it creates a serious student management problem before, during and after school.” (3)
- Structured play opportunities teach kids strategies to resolve these problems, which results in more kids being active and healthy. (3)
- “Recess clearly reaches the most kids for the most minutes each week. Anyone looking for the most direct way to engage children in meaningful, fun PA should put recess at the top of the list.” (7)

- “Children who go to large, urban schools...and with more than 50 percent minority enrollment and lowest income levels...are the ones most likely to have fewer minutes for recess or even lose recess altogether.” (8)
- “A modest investment in recess can have a positive ripple effect throughout the school.” (10)
- Results of 1 year of Sports4Kids at Ohrenberger Elementary School in Boston: “Kids reported feeling safer at recess, enjoying being physically active and being more likely to get involved in activities. Both students and teachers reported being more productive in the classroom.” (12)
- Two key reasons for the change: 1) “the level of student participation: by playing games that got everyone involved, kids were more likely to stay focused and involved.” 2) “Having an adult present and actively participating in games: kids tended to be more motivated to play when adults were directly involved in recess, and games were more likely to go smoothly.” (12)
- Funding available for structured play and PA during the school year goes first to afterschool programs, then to PE programs, and lastly, if at all, to recess. (13)
- Three things to do to take advantage of recess: 1) “Treat recess as an integral part of every school day.” 2) “Put trained adults on the playground.” 3) “Increase public and private funding for recess.” (15)
- Sports4Kids uses trained adults to teach kids various playground games, healthy nutrition, and violence prevention. It also does leadership training. The program is at 130 schools in Baltimore, Boston, DC and the San Francisco Bay Area. (16)

Rowland, T. W. (1999). Adolescence: A ‘Risk Factor’ for Physical Inactivity, President’s Council on Physical Fitness and Sports: Reader's Digest. 1-9

- "It appears that the basic trend for declining activity during life has a biological basis (Rowland, 1998). Evidence supports the presence of an inherent control center within the central nervous system which governs levels of activity. With increasing age, centrally-dictated caloric expenditure through activity declines, paralleling that of basal metabolic rate. The decline in PA with age is therefore largely intrinsic, the result of a fall in central drive as well as other biological factors, such as decreasing skeletal muscle mass in older years. There is no question, however, that the shape of the PA-age curve, i.e., the rate of decline in activity, is influenced by extrinsic or modifiable factors." (3)
- Both boys and girls show a decrease in PA over the course of high school. (3)
- “As the child grows, the biological drive for exercise energy expenditure declines and extrinsic factors affecting activity levels become more influential. This reaches a particularly critical point at adolescence, when the diminished inherent drive for activity coincides with increasingly important psycho-social factors which influence involvement in PA. Unfortunately, these extrinsic factors often act negatively to diminish activity levels during the teen years.” (4)
- “Females face social pressures that have historically linked physical prowess and athleticism to maleness, and gender differences in activity have traditionally been accounted for by perceptions that femininity is not consistent with vigorous activity and sports play.” (4)

- “Despite the presence of a cross-sectional association between fitness and cognitive performance, no clear picture has emerged with respect to the effect of exercise on cognitive performance.” (5)
- “It is possible that the factors which threaten to diminish PA habits during adolescence can be utilized instead as means of exercise promotion. For example, the educational message that the individual can and should accept responsibility for his or her own health (and exercise habits) is consistent with the adolescent’s growing need for independence. Similarly, providing the adolescent with a choice of activities may prove more effective than PE programs that dictate a curriculum. For instance, using community programs, it might be possible to offer a choice of activities such as rock climbing, in-line skating, or kayaking that would prove more appealing to the adolescent than traditional PE programs.” (6)

S

Sallis, J. F., Patterson, T. L., Buono, M. J., and Nader, P. R. (1988) Relation of Cardiovascular Fitness and PA to Cardiovascular Disease Risk Factors in Children and Adults. *American Journal of Epidemiology*, 127, 933-941

- Study in 88 male adults, 180 female adults, 148 male kids, 142 female kids. Measures of biological factors and self report of PA were used. (933)
- “All correlations between cardiovascular fitness and risk factors in adults were moderately strong and significant. All correlations indicated lower risk among more fit individuals.” (935)
- “For male adults, energy expenditure did not correlate with any risk factors, but for female adults, energy expenditure was significantly correlated with body mass index and the HDL/LDL ratio in the predicted direction.” (936)
- “The pattern of results in children was similar to that found in adults. For both male and female children, fitness was significantly correlated with all risk factors (except HDL/LDL in males)...Fitness and diastolic blood pressure were correlated in male children...Again, energy expenditure was correlated with none of the risk factors in male children and only with HDL/LDL in female children. The activity rating was significantly correlated with heart rate and body mass index in male children, and diastolic blood pressure, heart rate and HDL/LDL in female children.” (936)
- Cardiovascular fitness is correlated with cardiovascular disease risk factors while measures of PA are only weakly correlated. (937)
- The lack of connection between PA levels and cardiovascular disease risk factors was a surprise. (938)
- Fitness-risk factor and activity-risk factor correlations are higher in females (both adult and child) than males (both adult and child). (939)

Sallis, J. F., Patterson, T. L., McKenzie, T. L., and Nader, P. R. (1988). Family Variables and PA in Preschool Children. *Developmental and Behavioral Pediatrics*, 9, 57-61.

- Study looked at PA levels of 3-5 year olds (observed), BMI of child and parents, hereditary heart disease risk, parent PA levels, and child Type A behavior. (57)

- “Children were almost always outside in a playground, and there were no organized activities. The data suggest that either young children are not ‘naturally’ active or they have been socialized to choose low levels of activity.” (59-60)
- Cardiovascular disease risk level, father’s BMI, and parental PA correlate with moderate levels of child activity. (60)
- Problems with study: only low-income minority families whose children attended preschool, only one hour of school observation (may not be typical activity levels), small sample size, parent data was self-reported. (60)

Sallis, J. F., Prochaska, J. J., Taylor, W. C., Hill, J. O., and Geraci, J. C. (1999). Correlates of PA in a National Sample of Girls and Boys in Grades 4 through 12. *Health Psychology*, 18, 410-415.

- “Data were collected by means of telephone interviews with 504 children in grades 4-12 and their parents.” (411)
- “The modifiable variables with the strongest evidence of association with youth PA are self-efficacy and perceived physical competence, outcome expectations (or perceived benefits), intentions to be active, enjoyment of PA, social support from family and friends, and spending time in environments that facilitate PA.” (411)
- “Boys are more active than girls and that younger children are more active than older youth.” (411)
- Use of afternoon time, enjoyment of PE, time barriers (young girls) (lumped under “child variables”) were significantly correlated to PA. (412)
- Family support correlated highest with PA. (413)
- “Enjoyment of PE, use of afternoon time, and family support...should be targeted for change in all groups of young people...enjoyment of PE classes should be considered a health-related goal because it is related to PA outside of school.” (413)

Schwartz, M., Brownell, K. (2007). Actions Necessary to Prevent Childhood Obesity: Creating the Climate for Change. *Journal of Law, Medicine, & Ethics*, 78-89.

- This article focuses on the social, political, and environmental changes that need to occur in the world to overcome childhood (and adult) obesity.
- “Certainly there must be reasoned and well-funded efforts to change both the social norms and political action. It is our belief that legislative and regulatory action will be needed if substantial progress is to be made on the childhood obesity problem.” (79)
- “The aim of our paper is to discuss the factors that must be considered is bread-scale public health action to curb childhood obesity is to take place. We seek to understand the presence or absence of social action in light of key social values. Using the example of the US, we discuss how concepts of individualism, freedom, free-will, personal responsibility, freedom of speech, and the principals of the marketplace are central to the dialogue.” (79)
- “The food industry and our current government want to focus on encouraging individuals to think about ‘calories in and calories out’ and taking ‘small steps’ to change.” (79)
- “The key drivers of human over-consumption are flavor, variety, large portions, visibility, and proximity.” (79)

- “One industry tactic is focusing on increasing market share by gaining brand loyal customers, which explains their focused and relentless efforts to market their brands to children.” (80)
- “Most children spend less time walking to school and playing outside; instead they spend more time working and communicating on the computer, playing video games, and watching television.” (80)
- “A number of animal studies confirm the obesogenic impact of exposure to what researchers call a ‘super market’ or ‘cafeteria’ diet, which is a highly varied diet high in sugar, fat and sodium. Anthony Sclafani found that when rats were given unlimited access to a nutritious diet, they appear to be able to self-regulate their food intake and remain at a steady weight. However, when they are given access to a cafeteria diet high in sugar, fat and salt, they triple their body weight. These studies suggest that our internal self-regulation mechanism that keeps us from eating too many calories for our bodies can become dysfunctional.” (80-81)

Stock, S., Miranda, C., Evans, S., Plessis, S., Ridley, J., Yeh, S., Chanoine, J. (2007). Healthy Buddies: A Novel, Peer – Led Health Promotion Program for the Prevention of Obesity and Eating Disorders in Children in Elementary School. *Pediatrics*, 120, 1059-1068.

- This study “designed and tested a novel health promotion program for elementary schools that was based on peer teaching from older to younger schoolchildren (“Healthy Buddies”).” (1060)
- The program had lessons built in and each lesson “included 3 components of healthy living: nutrition, PA, and healthy body image.” (1060)
- “Compared with control students, both older and younger intervention students showed an increase in healthy living knowledge, behavior, and attitude scores and a smaller increase in systolic blood pressure. BMI and weight increased less in the intervention students in 4th through 7th grade and height more in the intervention students in kindergarten through 3rd grade.” (1060)
- “Our student-led curriculum improved knowledge not only in older school children but also in their younger buddies. It also decreased weight velocity in the older students. Student-led teaching may be an efficient, easy-to-implement way of promoting a healthy lifestyle from kindergarten to 7th grade.” (1060)

Story, M., Kaphingst, K., Robinson-O’Brien, R., Glanz, K. (2008) Creating Healthy Food and Eating Environments: Policy and Environmental Approaches. *Annual Review of Public Health*, 29, 253-272.

- This article covers a variety of topics on healthy food and eating, and it also includes reviews of many studies.
- “environmental changes [such as quantity, low price, and availability of processed foods, decrease in family meals, food marketing for “junk food” aimed at children, etc.] have influenced what, where, and how much we eat and are believed to have played a substantial role in the current obesity epidemic.” (254)
- Healthy “food availability and accessibility (whether available foods are in a form or location that facilitates their consumption, such as fruit on the counter) have been positively associated with healthful dietary intake in youth.” (255)

- “Even when taste preferences for fruits and vegetables were low, if fruits and vegetables were available intakes increased.” (255)
- If parents, teachers, or mentors “restrict foods, pressure children to eat, or use foods as rewards,” the children may rebel and be more inclined to eat nutritionally poor food. (256)
- Children need to be taught more about healthy eating and nutrition to “complement changes” that are implemented in their lives and to “increase skills for adopting healthy lifestyles.” (258)
- “Children ages 8-12 see the most food ads on TV. Most of the ads were for candy, snacks, sugared cereals, and fast foods; none of the 8854 ads reviewed marketed fruits and vegetables.” (264)

T

Tester, J., Yen, I., Laraia, B. (2010) Mobile Food Vending and the After-School Food Environment. *American Journal of Preventive Medicine*, 30, 70-73. Abstract.

- This study has an emphasis on low income and minority children due to their higher rates of obesity and being overweight, and because many times minorities and low income children live in areas where there are food venders after school.
- “This study aims to observe the after-school food environment in an urban area where mobile vending is known to occur in order to study the range of venders encountered near schools and the items sold in the after-school period.” (1)
- “Mobile food vendors in urban areas contribute to after-school and should be considered as a component of the school food environment.” (1, 2)

Thorpe, L. E. et. al. (2004). Childhood obesity in New York City Elementary School Students. *American Journal of Public Health*, 94, 1496-1500.

- National Health and Nutrition Examination Survey (NHANES) indicates the obesity in kids age 6-11 to be 15%, a dramatic increase from previous years (5% in 1960, 11% in 1988-1994). The most dramatic increase is among Mexican American and Black children, with increases of more than 10 percentage points, as opposed to 5% points reported among White children. (1496)
- “Obesity during childhood has important short-term medical consequences, including adverse effects on growth, blood pressure, blood lipids, and glucose metabolism. Other complications include respiratory conditions, such as asthma and obstructive sleep apnea. The long term medical consequences...include a greater risk of hypertension, diabetes, cardiovascular disease, gall bladder disease, and osteoarthritis in adulthood. Psychosocial consequences, such as negative self image, decreased self-esteem, eating disorders, and lower health-related quality of life.” (1496)
- A height and weight study was conducted in NYC public elementary schools, grades K-5.
- 43% were overweight: 24% were obese, 19% were overweight but not obese. 4% were underweight. (1497)
- No statistically significant difference in obesity rates for girls and boys. (1496)
- 31% of Hispanics, 23% of Blacks, and 16% of Whites were obese. (1497)
- Hispanic children were the only group where there was a statistically significant difference between obesity rates in boys and girls: 36% of boys compared to 26%. (1497)

- Hispanic boys had a higher prevalence of obesity than Black boys, who had a higher prevalence of obesity than White boys. (1497-8)
- Hispanic and Black girls had an equal prevalence of obesity; however, this prevalence was higher than that for White girls. (1497-8)
- “Between 1996 and 2003, overweight prevalence among Hispanic third-grade students escalated significantly, from 21% to 31%, whereas the increase in other groups was less than 5 percentage points and not statistically significant.” (1498)
- Low SES is a predictor of heavier weights. (1499)

Trost, S. G., Pate, R. R., Freedson, P. S., Sallis, J. F., Taylor, W. C. (2000). Using Objective PA Measures with Youth: How Many Days of Monitoring are Needed?. *Medicine and Science in Sports and Exercise*, 32, 426. Abstract.

- The purpose of this study was to establish the minimal number of days of monitoring required for accelerometers to assess usual physical activity in children.
- A total of 381 students (189 M, 192 F) wore a CSA 7164 uniaxial accelerometer for seven consecutive days...Average daily time spent in moderate-to-vigorous physical activity (MVPA) was calculated from minute-by-minute activity counts using the regression equation developed by.
- Compared with adolescents in grades 7 to 12, children in grades 1 to 6 exhibited less day-to-day variability in MVPA behavior...Compared with weekdays, children exhibited significantly higher levels of MVPA on weekends, whereas adolescents exhibited significantly lower levels of MVPA on weekends. Principal components analysis revealed two distinct time components for MVPA during the day for children (early morning, rest of the day), and three distinct time components for MVPA during the day for adolescents (morning, afternoon, early evening).
- These results indicate that a 7-day monitoring protocol provides reliable estimates of usual physical activity behavior in children and adolescents and accounts for potentially important differences in weekend versus weekday activity behavior as well as differences in activity patterns within a given day.

U

University of New Hampshire Cooperative Extension. Promoting Physical Exercise and Activity in Children.

- “Overweight children usually carry their excess weight into adulthood.”
- “Adults and children should get 60 minutes of PA every day, or most every day.”
- Parents who are physically active with their kids increase the kids own PA.

V

W

Wandner, L., Hair, E. (2009) Research Based Recommendations to Improve Child Nutrition in Schools and Out-of-School Programs. *Child Trends Research to Results Brief*, 2009-27.

- The purpose of this brief is to discuss children’s healthy lifestyles and diets, current nutritional guidelines and recommendations for children, and ways to measure how

healthy a child's lifestyle and diet are. It is focused on elementary and middle school children.

- "What constitutes a healthy diet?" 1. "Emphasizes fruits, vegetables, whole grains, and fat-free or low-fat milk and milk products;" 2. "Includes lean meats, poultry, fish, beans, eggs, and nuts;" 3. "Is low in saturated fats, trans fats, cholesterol, salt (sodium), and added sugars." (1)
- "Approximately 80 percent of children do not eat the recommended amount of fruits and vegetables. Moreover, as children get older, the quality of their diets tends to decline." (1)
- "What can schools and out-of-school time programs do to improve children's nutrition?" 1. "Provide children with more healthy food options." 2. "Implement programs to improve children's nutrition." 3. "Get parents involved in children's nutrition." (2)
- "Child weight loss programs that have positive impacts on children's nutrition include: Shapedown; Planet Health; The Weigh to Eat; Bienstar; Child and Adolescent Trial for Cardiovascular Health (CATCH);" (3) Information about these programs (and more programs) can be found at www.childtrends.org and type "Child weight loss programs" in the search bar.
- This brief also includes a series of questions to ask children in order to get a sense of their diet and lifestyle.
- See page 5 of this brief for "additional resources on nutrition for your program."

Whiteley, J., Bailey, B., McInnis, K. (2008). State of the art Reviews: Using the Internet to Promote Physical Activity and Healthy Eating in Youth. *American Journal of Lifestyle Medicine*, 2, 159-177. Abstract.

- "The Internet may prove to be an effective means of reaching youth to reduce overweight and ideally, prevent weight gain. This article reviews the available literature of Internet-based intervention promoting healthy eating, physical activity, and/or weight loss in school, home, camp, and medical settings. Findings show that few examples of well-designed trails exist in the youth literature. However, several studies show promise for the use of the Internet." (1)

Wood Baker, C., Little, T. D., and Brownell, K. D. (2003). Predicting Adolescent Eating and Activity Behaviors: The Role of Social Norms and Personal Agency. *Health Psychology*, 22, 189-198.

- Study: 279 participants; 197 girls, 82 boys; 13-17 years old. Two week longitudinal study, they seem to have used surveys to collect the data. Limitations: homogenous sample, self report measures.
- "The purpose of this study was to learn more about adolescents' motivations and intentions to perform two health behaviors that influence weight status: eating and PA. Despite their shared link to weight control, research has rarely examined determinants of PA and dietary behaviors simultaneously." (2)
- "A social norm's construct, which is critical in light of (a) the social nature of eating and exercise, (b) prevailing cultural norms about eating, body shape, and weight, and (c) heightened sensitivity to social influences during adolescence." (2)
- "In sum, differentiating peers and parents as separate referent groups and testing both their direct and indirect impact on intentions offers a better test of the role of social norms as a predictor of adolescent health behaviors." (3)

- “Peer and parent norms did not have direct effects on adolescents’ intentions to eat healthily, but as expected, they did predict attitudes. There were no differences between genders in the norms paths...however...girls’ perceived peer norms exerted a stronger indirect influence on eating intentions than perceived parent norms.” (12)
- “Although peer and parent norms predicted attitudes about PA, neither exerted a relatively stronger influence than the other. Also unexpectedly, peer norms directly predicted intentions for boys but not for girls.” (13)
- “Between-gender analysis revealed important differences between boys and girls on the eating model. Although intraself agency beliefs predicted intentions for girls, it did not have an influence for boys. For girls, a belief that one's own internal resources, such as self-discipline and effort, affect healthy eating predicted stronger intentions to eat healthily.” (13)
- “Both boys and girls, extraself agency beliefs and intraself means-ends beliefs exhibited negative influences on intentions. In other words, a stronger belief that healthy eating is affected by one's external resources, such as friends and family, predicted weaker intentions to eat healthily. And, perhaps most interesting, once a belief in one's own internal resources was accounted for, holding a causality belief that eating behavior is influenced by a person's internal resources had a negative influence on eating intentions.” (13)
- “Most notably, perceived peer norms directly influenced intentions to be active for boys but not for girls.” (14)
- “Two other findings of interest held across behaviors and gender: (a) extraself causality beliefs did not predict intentions, whereas (b) intraself causality beliefs had a significant negative influence on intentions after controlling for agency beliefs. This latter finding represents a suppression effect because bivariate correlations between intraself causality beliefs and intentions were positive.” (14)

X
Y
Z

Zabinski, M. F. et. al. (2003). Overweight Children’s Barriers to and Support for PA. *Obesity Research*, 11, 238-246.

- Study on overweight and non overweight children attending summer fitness camp or university-based weight loss clinic. The study looked at barriers to PA and support for PA. Measurements were collected via questionnaires. Only treatment seeking obese children participated in the study.
- Barriers to PA include: lack of time, personal/individual barriers, environmental barriers, and body consciousness is an issue for female adolescents. (238)
- “Overweight children, particularly overweight girls, reported body-related concerns as frequent barriers to PA. Overweight girls reported higher body-related barriers to PA than overweight boys and indicated body consciousness and concern about seeing their bodies while being active as the most common type of barrier to PA. Indeed, the perception of body awareness or consciousness as a potent barrier to PA seemed unique to overweight youth, as body-related barriers were the only type of barrier that differed between

overweight and non-overweight boys. Such body consciousness has not previously been cited among the most significant barriers to PA for general youth or adult samples.” (242)

- “Weight control or other health promoting interventions for overweight youth may need to encourage PA that minimizes body awareness or more proactively fosters better body-esteem among overweight children. Helping children learn to appreciate their bodies for what they can do, rather than how they look, may help to reduce feelings of self consciousness or embarrassment that may prevent PA.” (242)
- “Overweight children reported more frequent barriers to PA than non-overweight children, regardless of barrier type, although these differences in non-body type barriers seemed exclusive to girls.” (244)
- “The general gender difference observed in overall perceived barriers to PA, with girls reporting higher barriers, seems to be a reliable finding. This may be part of gender-based differences in the socialization around P...Attempts to reduce barriers to PA in children need to target girls. Findings in this study regarding support for PA also were gender specific. That is, overweight girls reported receiving less adult support for PA than their lean counterparts, whereas overweight boys reported similar levels of adult and peer support for PA as non-overweight boys.” (244)
- “Support from parents or caregivers has been shown to be related to children’s PA, especially if such support is action oriented...rather than simply providing prompts to be more active. In this study, older overweight girls reported receiving the least adult support, possibly reducing the likelihood of their participation in more active behaviors.” (244)
- Limitations to the study: two different populations from two different sources. The overweight kids were in treatment, the normal weight kids were general school population. Additionally, it was an all white sample, so generalizations cannot be made to other ethnic groups. Also, measurements were from self-reported data, which might have skewed the results as overweight children might perceive more barriers than are there.